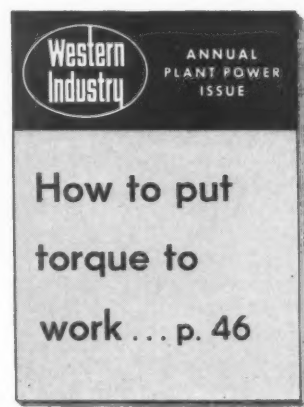
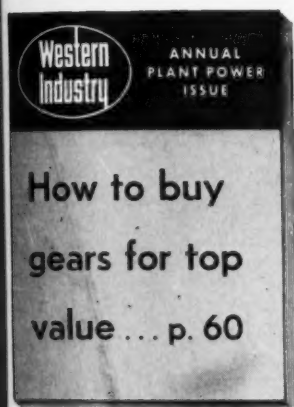
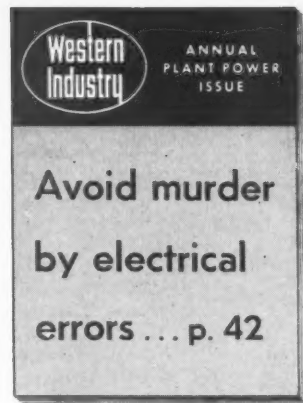
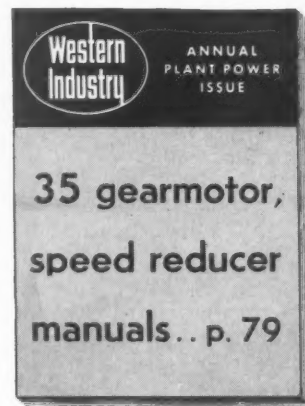
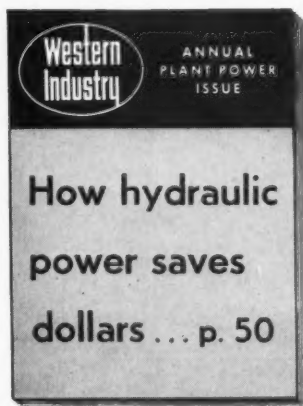
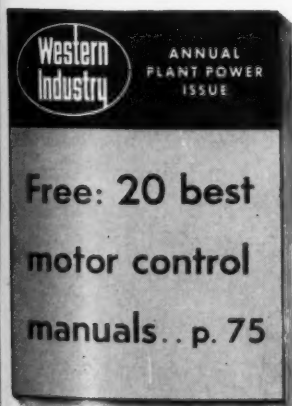


Western Industry

September 1956



ANNUAL PLANT POWER ISSUE



& BUYERS' DIRECTORY — 24 pages of manufacturer-distributor and address-phone facts you need for buying electrical, hydraulic, mechanical power transmission and other plant power equipment anywhere in the West...pp. 85-108 (green-edged pages)

for low cost . . . heavy-duty

Sanding or Grinding

and **MORE**

Man-Hour Productivity

SANDER GRINDERS. 3 models . . . 7 or 9 inch discs. 5000 RPM. For sanding metal or wood; grinding down welds and casting ridges; cleaning structural steel, tanks, boilers, vats, sheet metal, cutting casting risers and dressing down soldered joints.

7 inch model \$74.50

9 inch model (as illustrated) **\$89.50**

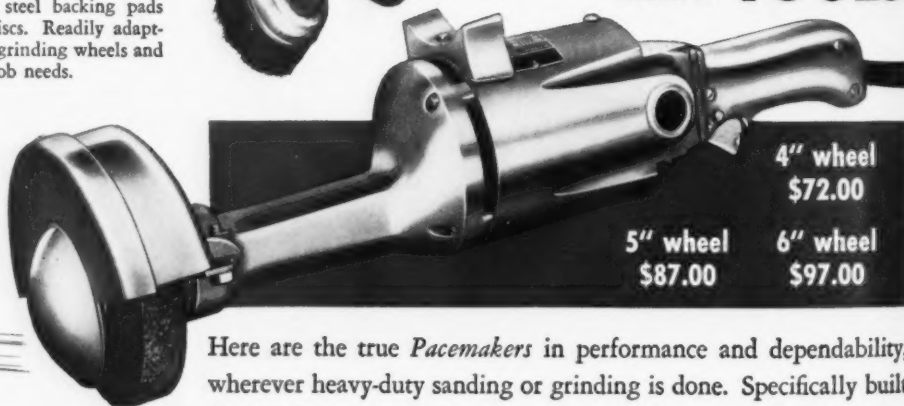


Milwaukee
HEAVY-DUTY
electric **TOOLS**

Available with either safety reinforced grinding discs or highly flexible cool running MILWAUKEE Exclusive nested spring steel backing pads and spiral abrasive sanding discs. Readily adaptable too for use with cup-type grinding wheels and wire brushes to meet specific job needs.



AERIAL GRINDERS. 3 models . . . 4", 5" and 6" wheel diameters . . . 4000 to 5500 RPM. For preparation of surfaces for welding, to smooth off welds, snag and grind castings, remove rust, scale and old paint, and general cleaning and buffing.



4" wheel
\$72.00

5" wheel
\$87.00

6" wheel
\$97.00

Here are the true *Pacemakers* in performance and dependability, wherever heavy-duty sanding or grinding is done. Specifically built for continuous duty service with rugged MILWAUKEE-Built heavy-duty AC-DC motors providing an abundance of dependable, stall-proof working power to see you through the toughest kind of jobs.

Call in your MILWAUKEE man today. . . . Let him explain and demonstrate how a MILWAUKEE tool franchise can help you to more sales and greater profits. . . . A brief note to: MILWAUKEE ELECTRIC TOOL CORPORATION, 2569 West Olympic Blvd., Los Angeles 6, California, will bring him to you . . . "pronto."

. . . for more details, circle No. 1 on Reader Service Postcard



DO YOU KNOW MONARCH

**SOLID TIRES GIVE YOU
GREATER SAVINGS
BECAUSE THEY
LAST LONGER!**



**torture tests prove MONARCH
Mono-Cushions® WEAR BETTER**

... TO THE FACTS. Severe fatigue tests on a Mono-Cushion and two leading competitive brands proved the MONARCH tire had *more than 50% greater resistance to wear, cutting and chipping*. The Mono-Cushion was a standard tire, molded from Monarch's new Compound T-48C ... the most durable solid tire stock developed to date.

With Monarch tires, you automatically reduce tire replacement costs ...

AND SAVE ...

because they give you premium quality and longer life *but cost no more than other brands*.

A complete range of types and sizes is available from lift truck dealers and independent tire distributors across the country. For additional details, see the Yellow Pages for name of nearest dealer, and ask him ... or write direct ... for BULLETIN TD-200.



6949-MR

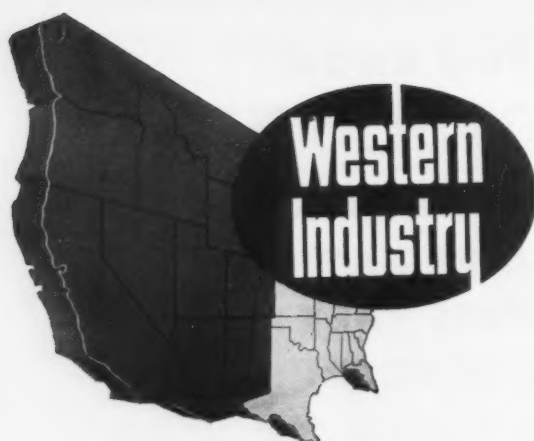


**THE
MONARCH
RUBBER COMPANY**

280 LINCOLN PARK • HARTVILLE, OHIO
• 7-255 General Motors Bldg., Detroit, Mich.
• 1035 Bartlett Street, Hayward, Calif.



... for more details, circle No. 2 on Reader Service Postcard



September 1956

Vol. XXI, No. 9

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 . . . and is, at the rate of 30 lives per year in California's plants alone.
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First complete Western Industrial Power Equipment
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 . . . see the green-edged section . . . and keep it handy.

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Serving Plant Operating Executives in the Nation's Fastest Growing Region

San Francisco to Chicago—9¢ a book! Ship UNITED!



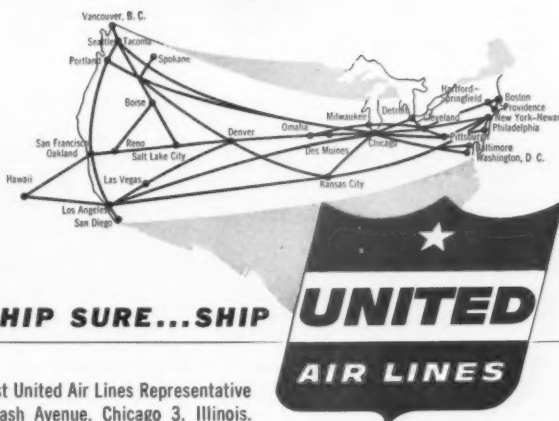
DEALERS' SAMPLE BOOKS leaving San Francisco aboard United's 300-mph DC-6A "Big Lift" Cargoliners arrive in Chicago in just 7 hours! Cost for 100-lb. shipment—\$18.80*

AND YOU GET THESE UNITED "EXTRAS"
 —Space dependability made possible by Reserved Air Freight. . . On-time dependability, by weather-mapping radar. . . Faster, safer handling, by pre-loaded aluminum pallets. . . Day and night cargo service, by United's frequent Mainliner and Cargoliner schedules.

Examples of United's low Air Freight rates

	per 100 pounds*
CHICAGO to CLEVELAND	\$4.78
NEW YORK to DETROIT	\$5.90
DENVER to OMAHA	\$6.42
SEATTLE to LOS ANGELES	\$9.80
PHILADELPHIA to PORTLAND	\$24.15
SAN FRANCISCO to BOSTON	\$27.00

*These are the rates for many commodities. They are often lower for larger shipments. Rates shown are for information only, are subject to change, and do not include the 3% federal tax on domestic shipments.

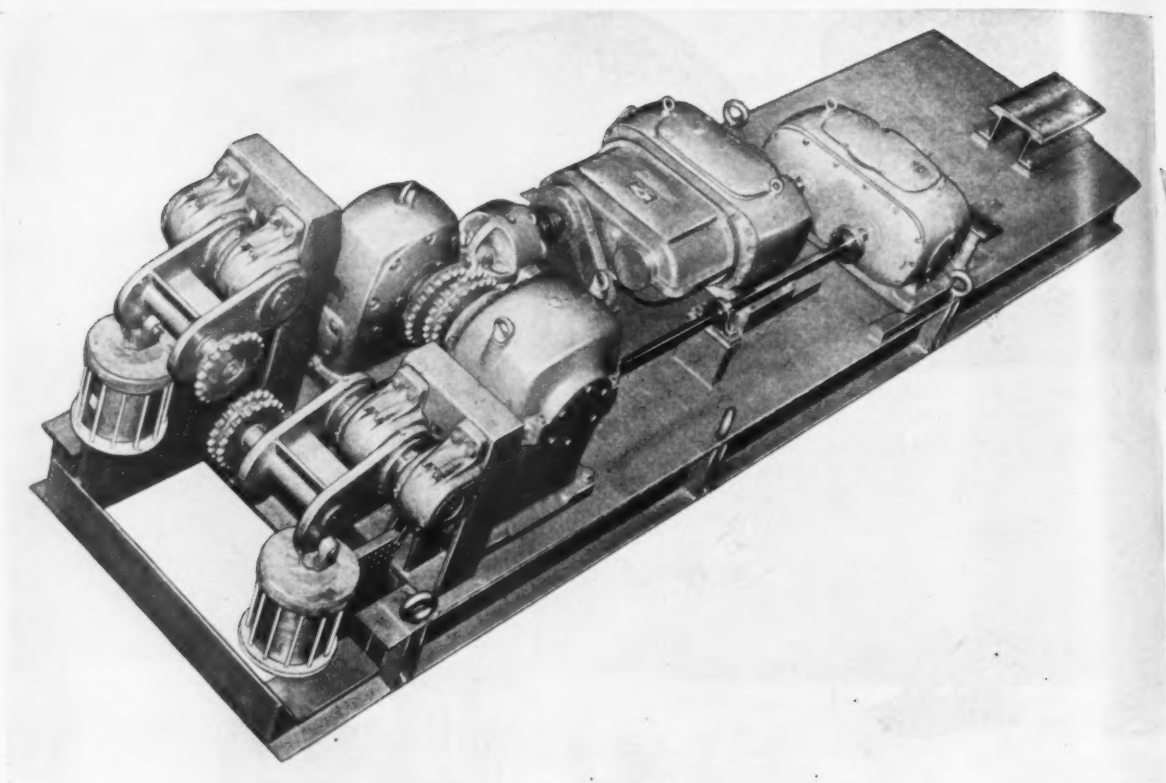


SHIP FAST...SHIP SURE...SHIP

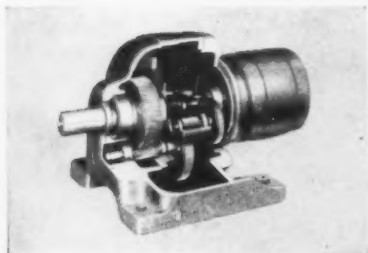
For service, information, or free Air Freight booklet, call the nearest United Air Lines Representative or write Cargo Sales Division, United Air Lines, 36 South Wabash Avenue, Chicago 3, Illinois.

... for more details, circle No. 3 on Reader Service Postcard

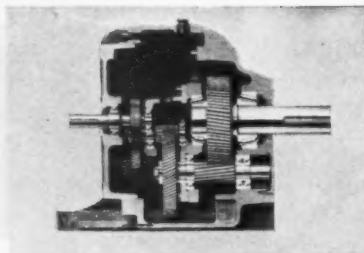
LINK-BELT is your one-source headquarters- fo



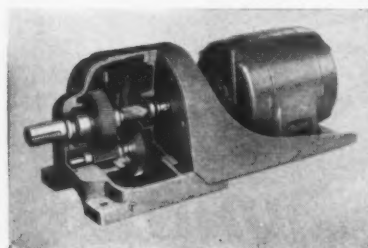
ENCLOSED DRIVES



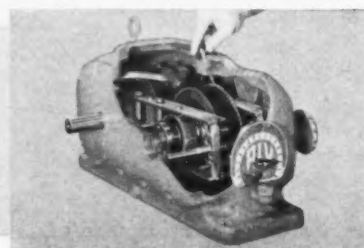
GEARMOTORS maintain positive alignment with flange-mounted NEMA motors. They're compact, quiet, oil-tight. Sizes to 30 hp, ratios to 292:1.



IN-LINE HELICAL, WORM AND PARALLEL SHAFT GEAR DRIVES — Link-Belt makes a broad range of types and sizes in various ratios and up to 2400 hp.

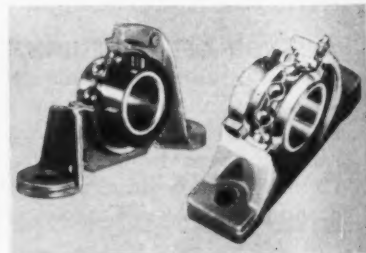


MOTOGEARS permit bracket-mounting of all makes and enclosures of foot-type NEMA motors. Capacities to 60 hp, ratios to 292:1.

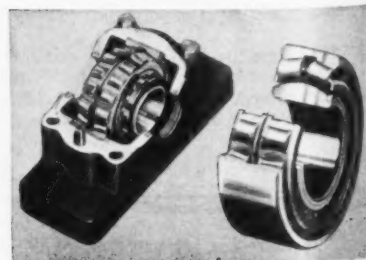


P.I.V. VARIABLE SPEED DRIVES provide stepless, instant variation through a complete range of positive speeds; 8 sizes, 16 types, to 25 hp.

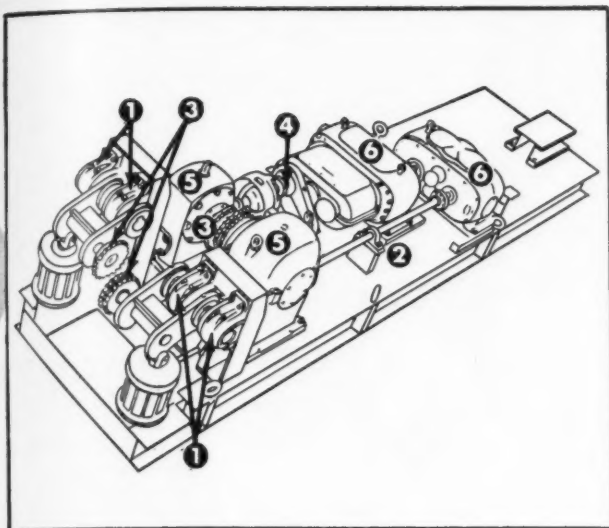
BALL and ROLLER BEARINGS



BALL AND ROLLER BEARING BLOCKS—Free-rolling, self-aligning, easy-to-install. Industry's most complete line of pillow blocks, flange, flange-cartridge, cartridge, take-up and hanger blocks, plus self-aligning roller bearings. Effective seals keep grease in, dirt out. For all popular shaft sizes and speeds to suit your requirements.



for every power transmission need



PRE-INTEGRATED DRIVE BY LINK-BELT synchronizes operation of two conveyors handling insulation. Link-Belt equipment includes (1) roller bearing pillow blocks, (2) ball bearing pillow blocks, (3) roller chain drives, (4) encased chain drive, (5) worm gear drives and (6) P.I.V. Variable Speed Drives. All equipment is mounted on a common baseplate.

WHETHER you need a single component or a completely engineered drive—Link-Belt is your most convenient source for power transmission equipment and engineering service. A complete line of products—each in a wide range of types and sizes—assures the right selection for your particular load, horsepower and other operating requirements.

Equally important, all Link-Belt equipment is built to the highest standards—service-proved designs offering longer life at lower cost. What's more, all components are correctly integrated for smooth-working efficiency—with no elements under- or over-rated.

This one-source convenience also simplifies your purchasing—insures fast delivery and prompt, dependable service. For complete information and literature on any Link-Belt power transmission or materials handling product, get in touch with your nearest Link-Belt office.



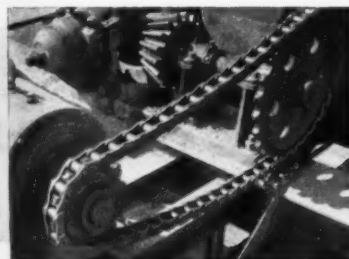
POWER TRANSMISSION MACHINERY

LINK-BELT COMPANY: Plants, Sales Offices and Factory Branch Stores at San Francisco 24, Los Angeles 33, Seattle 4. Sales Offices and Factory Branch Stores at Portland 10, Spokane 10, Oakland 7, Salt Lake City 1. Stock Carrying Distributors in Principal Areas.

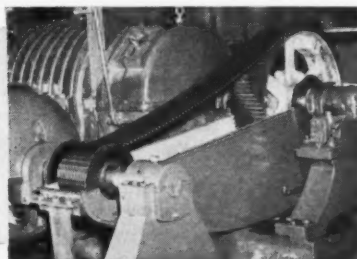
ONE SOURCE . . . ONE RESPONSIBILITY FOR POWER TRANSMISSION AND MATERIALS HANDLING MACHINERY

CHAINS AND SPROCKETS

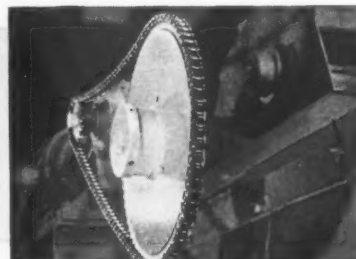
14,235-P



MALLEABLE IRON, PROMAL, STEEL CHAINS—Complete line of cast, combination, forged and fabricated chains plus matching sprockets.

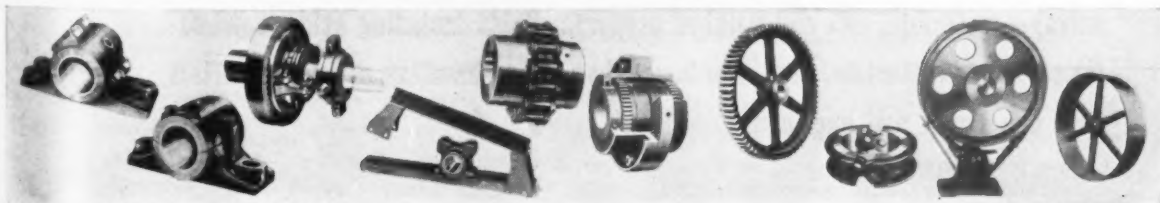


SILENT CHAIN DRIVES—Ideal for large or small hp, large ratios, high speed and limited space. Maintain better than 98% efficiency.



PRECISION STEEL ROLLER CHAIN—For drives and conveyors, available in single or multiple widths, in 1/4" to 3" pitch and 1" to 3" double pitch.

TRANSMISSION PRODUCTS



Reading from left to right, *babbitted and bronze bearings* in 15 types, 300 sizes. New *friction clutches* with high-torque capacity. Complete line of ball, roller and

babbitted bearing takeups. Flexible, rigid, and fluid *couplings*. Cut and cast *tooth gears*. *Shaft collars* in solid or split malleable iron and steel types. *Backstops* to

automatically prevent backward movement of conveyors and elevators. Gray iron and welded steel *pulleys*.

... for more details, circle No. 4 on Reader Service Postcard
See Directory listing page 97

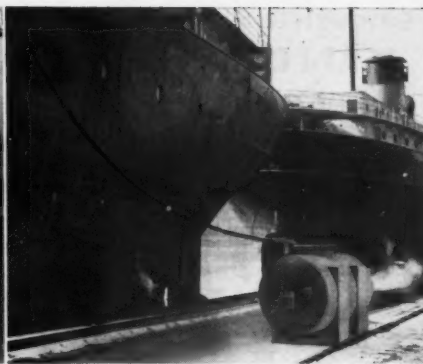


Here's *MASS-HANDLING* of bulk

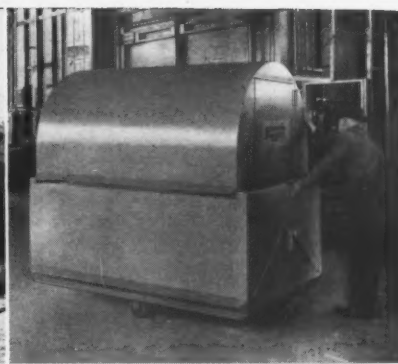
What you see above is a Dempster-Dumpster serving one of its detachable containers. Multiply this simple pick up, haul and dump operation by scores of steel containers built to meet your requirements for handling waste or salvable materials, raw and finished products, fluids including acids, combustibles, dusty materials, etc. You have, then, mass-handling of bulk materials with one truck and one man!



Tilt Type Container is handling filter dirt at a plant in Illinois. Note container is equipped with casters and placed under chute, through which the filter dirt passes directly from presses. As each container is filled, it is replaced with an empty one.



Tank Type Container is being filled with used oil from a ship. Time required to haul loaded container to reclaim station, drain and return for refilling—10 minutes. Time cycle of the former method using conventional barrels—60 minutes.

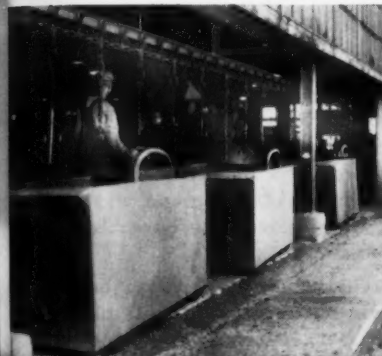


A loaded Apartment Type Container, equipped with roller bearing casters, is being rolled to outside of this plant building. Dempster-Dumpster will pick it up, haul to disposal area, dump the refuse and return empty container for refilling.

Three heavy duty Drop Bottom Type Containers, shown below, are loaded with cast iron fittings from conveyor at plant in Birmingham. Dempster-Dumpster picks up each container when loaded and hauls the finished products to shipping department.

Here's another example of the many types of waste materials handled by this system. The Skip Type Container shown below is located under hydropulper at a paper plant. Picture was shot while container was being filled with rope waste sludge.

Waste materials are loaded into these Universal Containers at a food plant warehouse. Containers have lids in top, as well as a door in each end, which are opened to make deposits, then closed, sealing materials in container.



materials with one truck...one man!

A FEW OF THE HUNDREDS of containers available are shown above in actual service. They are built in capacities up to 21 cu. yds.—several times the capacity of the average dump truck body. One Dempster-Dumpster, operated by only one man, the driver, serves scores of big detachable containers, one after another—handling materials of every description. It's like having one truck with scores of bodies!

Records of performance in dozens of installations prove beyond question that savings are tremendous! The Dempster-Dumpster System cuts costs of equipment and operation. It is common knowledge that one Dempster-Dumpster will perform the work of several conventional trucks, reducing investment ac-

cordingly. This system eliminates standing idle time and re-handling of materials. Once placed in these containers, materials remain there until hauled to destination. Efficiency, sanitation and good plantkeeping are big advantages. Materials to be transferred or disposed of are constantly being placed in the containers as they accumulate. Containers for handling refuse are fire-proof, rat-proof and scavenger proof.

With no obligation on your part, our engineers will be glad to make a comprehensive fact-finding survey to determine the cost-cutting possibilities of this equipment in your plant. Write us for complete information today! Manufactured exclusively by Dempster Brothers, Inc.

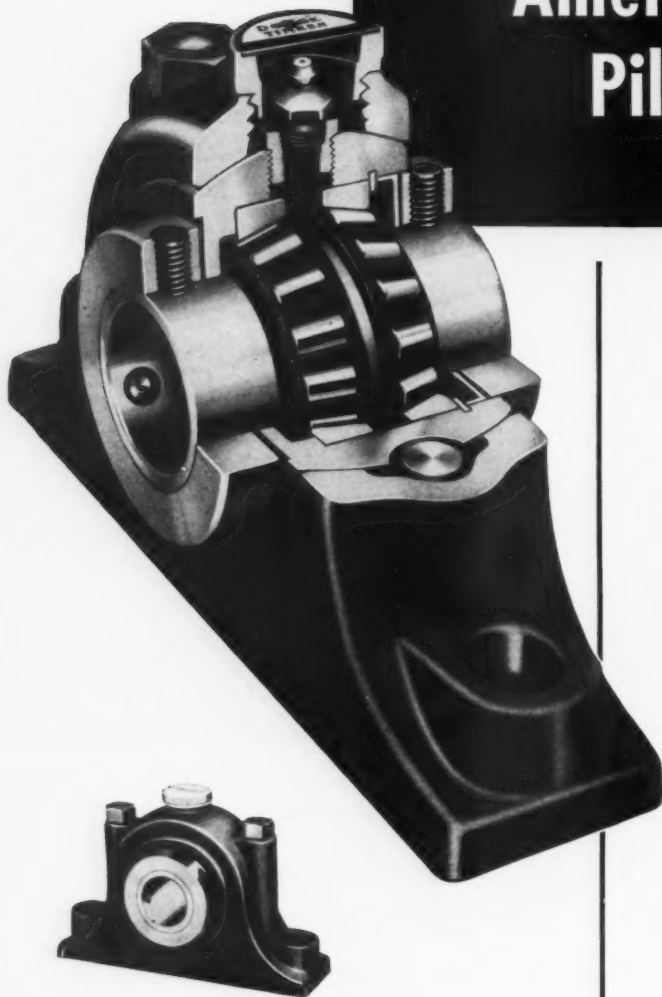
DEMPSTER BROTHERS 596 N. Knox, Knoxville 17, Tennessee

... for more details, circle No. 5 on Reader Service Postcard

AVAILABLE IN FIVE TYPES
FOR ALL KINDS OF SERVICE

DODGE-TIMKEN

America's Quality Pillow Block



- COMPLETELY ASSEMBLED
- FACTORY ADJUSTED
- PRE-LUBRICATED



Call the Transmissioneer, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE-TIMKEN Bearings are adjusted, lubricated and sealed at the factory. Labyrinth seals effectively retain the lubricant and prevent the entrance of dust and dirt. The inbuilt precision of Dodge-Timken Bearings is protected both on and off the shaft. They are delivered fully assembled, ready to mount.

Where service conditions are toughest Dodge-Timken Bearings prove their quality decisively. For superior performance, dependability and long life they have won their reputation throughout industry as America's quality pillow blocks.

To meet varying service requirements Dodge-Timken Pillow Blocks are available in five types—the type E... Double Interlock (illustrated)... Type C... Special Duty ... and All-Steel. Available in a range of shaft sizes from 1-3/16" to 10".

Call your Transmissioneer; or write for Bulletin A638 giving load ratings, dimensions and other data on Dodge-Timken Roller Bearings.

DODGE MANUFACTURING CORPORATION
6600 Union Street, Mishawaka, Indiana

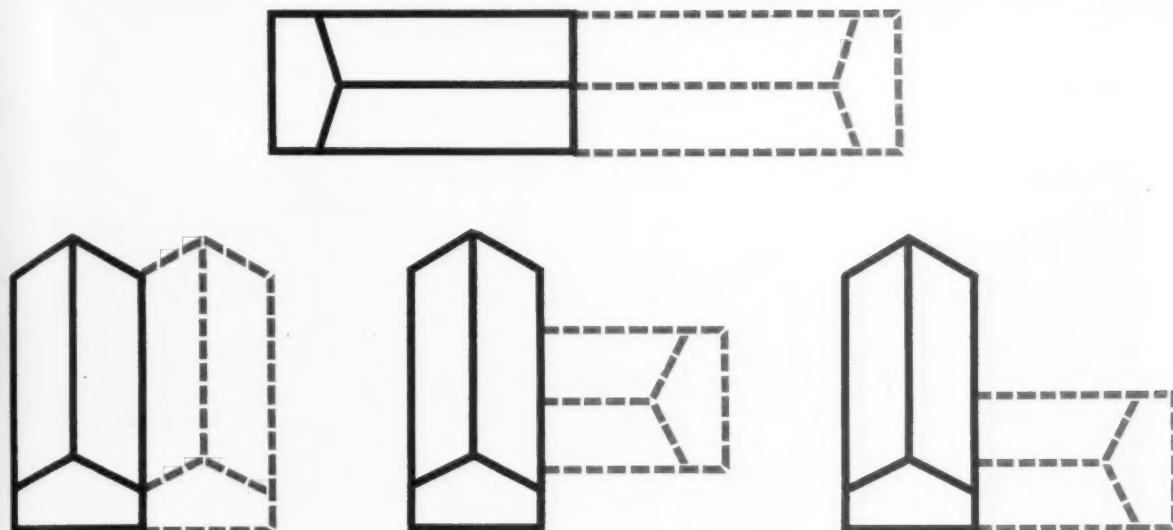
DODGE
of Mishawaka, Ind.

... for more details, circle No. 6 on Reader Service Postcard

See Directory listing page 91

WESTERN INDUSTRY — September 1956

Soulé mass production miracle!



Buildings that Grow with your Business

Quickly, at Low Cost

Soulé Buildings can expand with your business. All bolted construction permits fast, low-cost addition of building units. You can easily increase length, width, and add "T" or "L" shapes. There's no costly breaking through brick or concrete walls, no mess or loss of time. Existing sheets are removed from side or end to be expanded. New frame sections are bolted into place and the new unit is sheeted, utilizing sheets removed from original structure. Your present Soulé building is completely usable during expansion! You cannot buy a more practical, efficient business structure!

Widths: 32', 40', 50', 60', 70', 80', Eave heights: 10', 12', 14', 16', 18', 20', Lengths: multiples of 20'

PHONE OR WRITE FOR ILLUSTRATED BUILDING CATALOG, COSTS



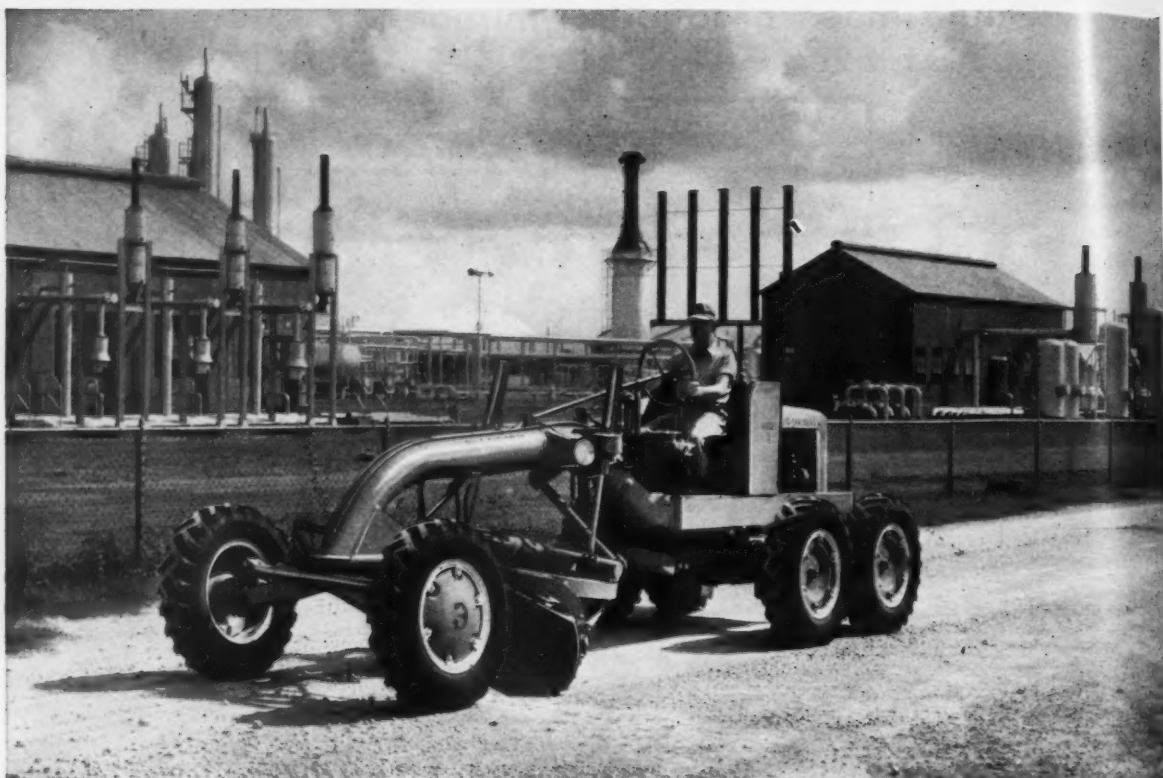
3720

SOULÉ STEEL COMPANY

Department J

San Francisco 1750 Army Street, Valencia 4-4141
Los Angeles 6200 Wilmington Avenue, Ludlow 5-0911
San Diego 3741 Fifth Avenue, Cypress 5-6289
Fresno 850 R Street, Fresno 4-6930
Portland 2630 N.W. St. Helens Road, Capitol 3-5154
Seattle 4100 West Marginal Way, Holly 3600
Spokane 405 American Legion Building, Madison 6000
Phoenix 2026 South 11th Avenue, Alpine 3-3178
Salt Lake City 220 Greyhound Building, Empire 3-7601

... for more details, circle No. 7 on Reader Service Postcard



Allis-Chalmers Model D motor grader offers A NEW, SMOOTH APPROACH TO PLANT YARD MAINTENANCE

As more plants utilize their yards for storage, more plant managers are discovering the unusual value of an Allis-Chalmers Model D motor grader. They are discovering it is an ideal yard maintenance machine.

The Model D has all the essential design and performance features of motor graders costing up to three times as much. It keeps plant roads and storage areas smooth and well drained as only a full-fledged motor grader can, yet it is compact enough to work easily where larger machines cannot maneuver.

Further, its unusual versatility keeps the Model D working twelve months a year. With a rear-mounted, $\frac{5}{8}$ -yd hydraulic loader, it loads excess dirt from windrows, maintains stockpiles, clears and loads snow . . . handles many other jobs that normally call for specialized equipment.

Ask your Allis-Chalmers construction machinery dealer to show you how the Model D can smooth out your yard maintenance problems, or write for complete literature.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

MODEL D MOTOR GRADER (Choice of two engines)

	Gasoline	Diesel
Brake hp	50	50
Weight (bare)	8,800	9,350
Four forward speeds	to 25.6 mph	to 25.2 mph
Reverse Speed	to 3.3 mph	to 3.2 mph

Optional Equipment—Power Circle Turn, Leaning Front Wheels, Hydraulic Shiftable Moldboard

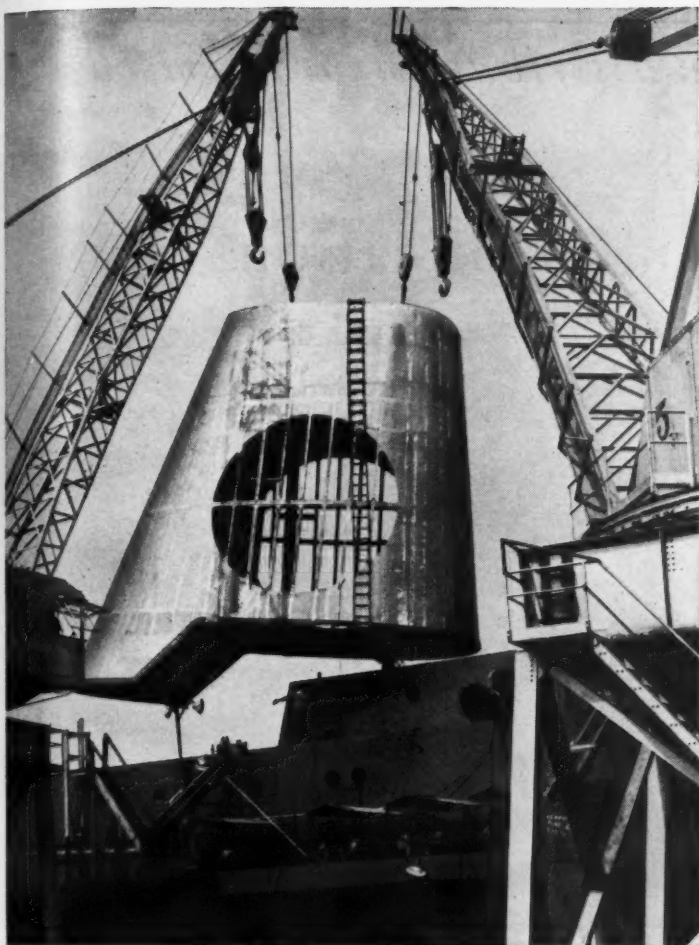


Hydraulic loader attachment greatly increases the usefulness of the Allis-Chalmers Model D motor grader. Other attachments include scarifier, wind-row eliminator, snowplows. Optional cab provides operator comfort the year around.

... for more details, circle No. 8 on Reader Service Postcard

ALLIS-CHALMERS





The SS Mariposa's stack and swimming pool are a small part of the 10,000 tons Tiger Brand ropes have lifted aboard this new Oceanic Steamship Co. luxury liner (due to sail for Melbourne in October). These 37½-ton Colby cranes have used Tiger Brand ropes for 11 years (¾" on boom, topping and main block lift lines; ¾" on whip lines). The operators, Willamette Iron & Steel Company, say "it's been 11 years of the most thorough satisfaction" (read why below).



A little difference (in wire rope) can mean a lot

The difference in the life of wire ropes may sometimes be small. But over a period of time, that small difference can add up to a lot of costly downtime on your equipment and unnecessary rope purchases.

Case in point: Willamette Iron & Steel Company. This Portland shipbuilding firm has kept careful track of Tiger Brand Wire Rope performance on their five "Whirly cranes" (above). The result confirms Tiger Brand's reputation for dependable quality: 100% safety and long, long life (some of WISCO's Tiger Brand ropes have been in service since 1945.)

Tiger Brand can do the same for you. A Tiger Brand Wire Rope Specialist will be glad to show you how Tiger Brand lines will last longer on your job (a hint: they are specially constructed for specific jobs).



NEW BOOKLET! FREE

UNITED STATES STEEL CORPORATION • COLUMBIA-GENEVA STEEL DIVISION
120 MONTGOMERY STREET, SAN FRANCISCO 6, CALIFORNIA WI-9
Please send free booklet, "Longer Life From Your Wire Rope".

NAME _____

ADDRESS _____

CITY _____

STATE _____



USS TIGER BRAND Wire Rope

United States Steel Corporation • Columbia-Geneva Steel Division

UNITED STATES STEEL

... for more details, circle No. 9 on Reader Service Postcard

do you solve your distribution problems by



...multiplication



division...

or simplification?

As your business has increased, have you multiplied the forms of transportation employed to handle your expanding distribution? Or, from expediency, have you divided it up among a number of carriers? If you have, there is a simpler...more efficient way to solve your shipping problem. Call CF!

In a day when mass distribution is as necessary to success as mass production, CF offers

*Less Than Truck Load

you a complete distribution-type service. *Serving more points direct than any other carrier in the west*, CF gives you one-carrier convenience . . . one-carrier responsibility, from your shipping dock to jobber or dealer door.

Whether you are shipping LTL* or full load, one shipment or many, CF's purpose is to give you the *direct* . . . sure . . . economical distribution you need.



**SEATTLE • PORTLAND • SAN FRANCISCO • OAKLAND
LOS ANGELES • SPOKANE • SALT LAKE CITY
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New SKIL 1/4" Drill...

**Up to 40% More
Powerful Than Other Drills
in its Price Range!**

**Faster, easier, more accurate drilling
... in maintenance and production!**

Only SKIL offers a 1/4" drill value like this. Although the new Model 134 is up to 40% more powerful than other drills in its price range, its light weight and new pistol-grip design make it easier to handle! Speeds through tough, hard-to-reach metal or wood drilling assignments... steps up production in maintenance, on the assembly line, or in the shop.

New revolutionary *dura-plastic* finish gives sure grip, resists wear. Quality SKIL features assure long life under rugged use. Put the new SKIL Model 134 on your production or maintenance team at the low price of only \$34.50! See it, try it today!

Advantages you'll find only in a SKIL Drill at this low price!

- New *dura-plastic* finish for easier, more positive grip.
- Quality geared chuck for fast, accurate bit changing.
- Ball bearing spindle for longer service, greater precision.
- Comfortable pistol-grip handle makes work easier, reduces fatigue.
- Large inspection plate for quick routine maintenance.



New Skil 1/4" Drill, Model 134
At Only \$34.50!

- Standard speed—1800 r.p.m.
- Capacity in steel, 1/4"; in wood, 1/2"
- Net weight, only 3 1/4 lbs.!

FREE DEMONSTRATION AND FREE TRIAL!

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Made only by SKIL Corporation, formerly SKILSAW, Inc.,
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When you buy a drill be sure it's a SKIL!

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- ☐ I would like a demonstration and trial—FREE!
☐ Please send me illustrated literature on SKIL Model 134.

Name

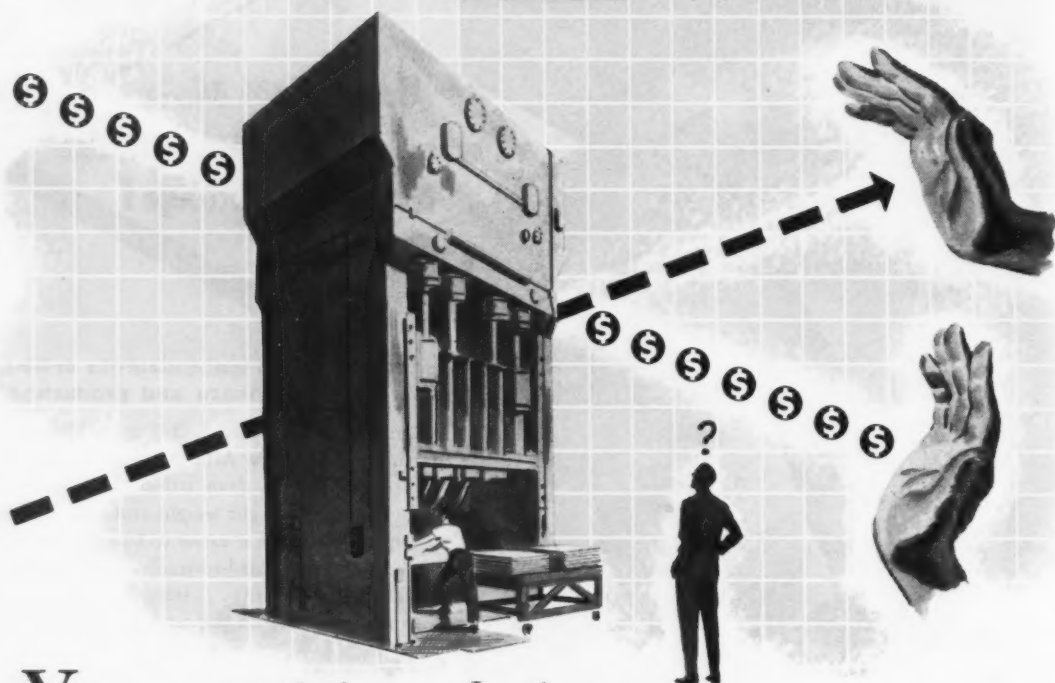
Company

Street

City Zone State

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Can troubles in hydraulic systems be stopped before they get costly?



Yes...and here's how
Shell men and techniques
do it with an oil



"Correct the *causes* of trouble in hydraulic systems"—that was the task Shell Research men set for themselves. *Do* something about oil oxidation that creates sludge and lacquer... interferes with smooth, dependable valve action. Cut down, too, on *rust* and fight *wear* so as to prolong pump life.

Shell scientists did all that when they developed SHELL TELLUS OIL. This oil contains specially developed and thoroughly proven oxidation and wear inhibitors. In plant after plant, this oil has proven its ability to resist oxidation and foaming... to lengthen pump life and save the thousands of dollars that are often lost through hydraulic breakdowns.

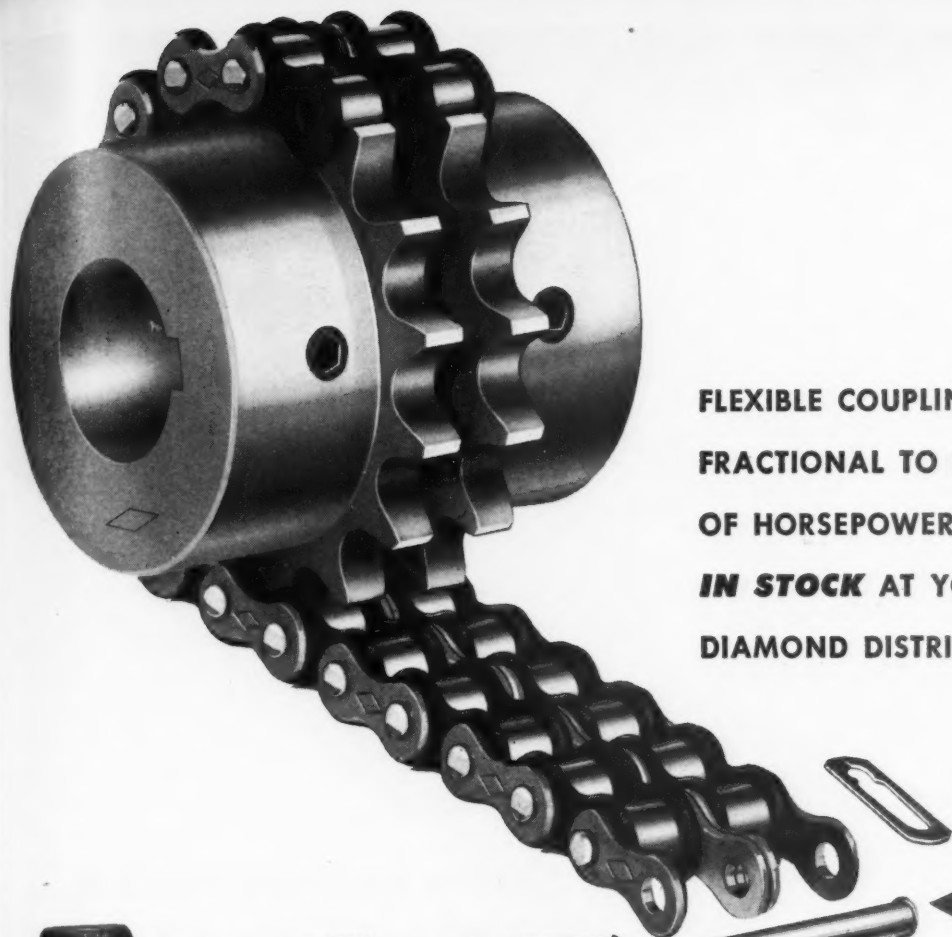
Shell Tellus Oil is just one of the many fine products developed by Shell's 1500-man research team—a team with 25 years' experience in lubrication problems.

A telephone call can put this team to work solving your problems. Call in your Shell representative today.

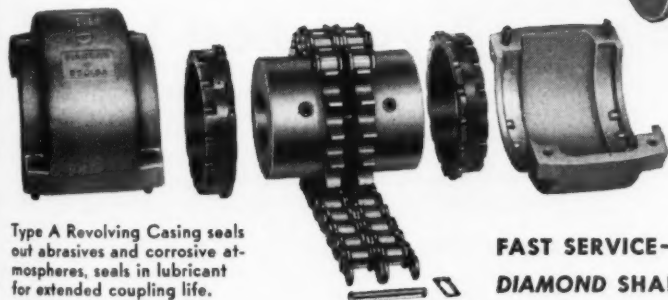
SHELL TELLUS OIL



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WESTERN INDUSTRY — September 1956



**FLEXIBLE COUPLINGS—
FRACTIONAL TO HUNDREDS
OF HORSEPOWER
IN STOCK AT YOUR
DIAMOND DISTRIBUTOR**



Type A Revolving Casing seals out abrasives and corrosive atmospheres, seals in lubricant for extended coupling life.

**FAST SERVICE—HIGH CAPACITY—SUPERIOR QUALITY
DIAMOND SHAFT COUPLINGS**

◆ End to end shaft connections can be made quickly, inexpensively and in minimum space with Diamond Flexible Couplings. Load is carried at the greatest radius and distributed evenly over the entire length of chain for maximum capacity and life. Moderate angular and parallel misalignment as well as shaft end float are absorbed in the clearances between chain and sprocket teeth.

◆ You probably have many applications where the use of Diamond Flexible Couplings can provide improved operation and long dependable service. Call your nearest Diamond Distributor for immediate service. His name is in the yellow pages of the telephone book under the heading Chains or Chains-Roller.

Bulletin No. 19 contains complete selection data for stock Diamond Couplings. Your copy sent on request.



DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

Dept. 606, 402 Kentucky Ave.

Indianapolis 7, Indiana

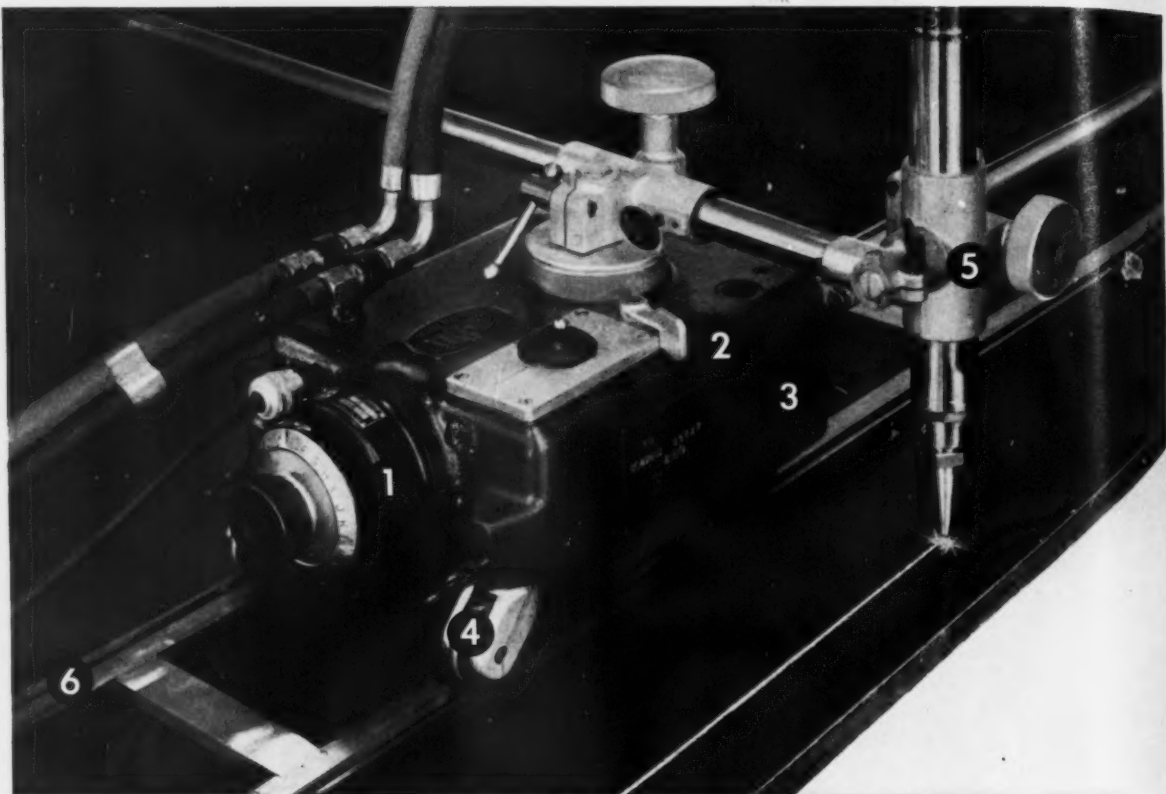
Offices and Distributors in All Principal Cities

DIAMOND



**ROLLER
CHAINS**

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See Directory listing page 90



Quality in Details! these factors make the Airco #10 Radiograph your best buy

The #10 Radiograph is a portable (43 lb) gas cutting machine designed to cut metals up to 6" thickness. It will cut straight lines of any length, circles from 3" to 85" diameter, arcs up to a radius of 42½" — all with square or beveled edges. Designed to provide the greatest degree of cutting accuracy and convenience of operation, the husky overall construction of the #10 has made it an indispensable tool wherever steel is to be cut to size for fabrication. Here are a few of the *quality details* that don't meet the eye:

1. Governor Control Variable Speed Motor puts the entire speed range (4 to 50 ipm) at operator's fingertips. An indicator showing all speed settings is provided. Speed can be increased or decreased while cutting is in progress... speed is not affected by load or voltage changes.

2. Clutch Lever allows the machine to be rolled freely in either direction. This feature is a time-saver when aligning the machine with work.

3. Drive Shaft (under housing) runs on replaceable needle bearings which reduce friction to a minimum and affords a maximum of free motion.

4. Castor Wheels run in a machined groove in track for greater machine stability and more accurate cutting.

5. Torch Holder Assembly is made of brass forgings which withstand more abuse than castings and have greater corrosion resistance than iron or steel.

6. Track is cold rolled steel with two machined grooves in which wheels travel, and has track sections with tongue and grooved joints for correct alignment when multiple lengths are used for progressive cutting.

Airco oxyacetylene shape cutting machines include the Airco Camograph, Monograph, Duograph, Oxygraph and Travograph. Write today for literature.

welding
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Air Reduction Pacific Company is a division of Air Reduction Company, Incorporated. Principal products of other divisions include: PURECO — carbon dioxide, liquid-solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • AIRCO — acetylenic chemicals • COLTON — polyvinyl-acetates, — alcohols, and other synthetic resins.

... for more details, circle No. 14 on Reader Service Postcard
WESTERN INDUSTRY — September 1956

CLARK ELECTRICS AT ALFORD REFRIGERATED WAREHOUSE

...are key to efficiency

A Texan named Fred Alford operates what might be called, "the biggest ice box this side of the polar ice cap." It's the world's largest refrigerated warehouse. Key to the efficient operation of this bonanza is a fleet of Clark Electric fork trucks. There are some important reasons why.

Electric trucks move material at the lowest cost per ton mile—and with Clark Electrics, you get the electric truck with the power saving dual field motor that provides more ton-miles per battery charge.

But it takes more than features. How about 3 years from now, or 5 years, or 10? That's when you depend on service—fast, local service.

And that's where your local Clark dealer comes in. He offers prompt mobile service for emergencies, the largest supply of service parts in the industry—genuine Clark parts that are warranted and guaranteed for quality. And he provides a completely equipped shop for rebuilding, a fleet of rental trucks to help you over peak work loads. Fact is, he offers a complete service package. Look in the Yellow Pages under "Trucks, Industrial" for the Clark dealer nearest you.

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 28, Michigan

**CLARK®
EQUIPMENT**

A BETTER BUY WITH LOCAL SUPPLY—*Genuine Clark Parts*



... for more details, circle No. 15 on Reader Service Postcard



SHE CAN'T WORK OVERTIME, unless her job becomes essential to the defense program . . .



. . . while these women, processing perishable produce, are allowed to work beyond 8 hr. per day, 48 hr. per week. With few other exceptions, no overtime is allowed, and that's why . . .

THE WOMEN WANT AMENDMENT OF THE EIGHT-HOUR LAW in California. And they've gone into action to get a proposed amendment placed before the 1957 Legislature. In later issues WI will cover the "women in industry" situation in other Western states. Here's the California story:

At present, there are three separate provisions of California law relating to hours of employment for women. (1) **The Eight Hour Law** applies only to the industries and establishments named in it and limits with few exceptions the employment of females to 8 hr. per day and 48 hr. per week. The only provision for work beyond these hours in industry is in the processing of perishable fish, produce, and biologicals; for lab technicians; and for professional and executive occupations with a salary of \$350 or more per month. (2) **The orders of the California Industrial Welfare Commission**, which cover all industries and pro-

vide for a basic 8-hr. day and 6-day week but allow overtime beyond these hours in an emergency, for firms not subject to the Eight Hour Law, provided time and a half the regular rate of pay is paid for those hours. (3) **The Defense Production Act**, which provides exemption from the hour restrictions of the Eight Hour Law for women engaged in work essential to the defense program. In this case, the governor, upon recommendation of the Department of Industrial Relations, must grant permits for overtime employment of women for a specified number of hours at time and a half the regular rate of pay.

Behind the move to modify these restrictions is the growing Business and Professional Women's Clubs of California. The club has drafted a proposed wording for an amendment that would be added to the Labor Code, with the first paragraph reading: "Notwithstanding the provisions of Sections 1350 and 1351 or of any order adopted by the Industrial Welfare Commission, any woman 18 years of age or over employed in professional, technical, or clerical occupations, may be permitted or required by her employer to work in excess of the maximum hours prescribed by Sections 1350 and 1351 or prescribed by an order of the Industrial Welfare Commission, during an emergency, if such employee is paid, for time worked in excess of such hours, at a rate of not less than one and a half times per straight time rate of pay. 'Emergency,' as used in this section, means an unpredictable and unavoidable occurrence at unscheduled intervals, requiring immediate action. This section shall be effective only in cases where the employer, upon learning of the emergency, exercises reasonable diligence to provide relief immediately for the employee required to work over the prescribed number of hours." Second paragraph of the amendment defines occupations to be covered by the ruling.

Public hearings on the proposal have now been held before the Senate Labor Committee in Los Angeles, San Francisco, and Sacramento. They were well attended, with spirited discussion both for and against the amendment. Testimony was heard from individual women workers, employers, labor organizations, the Business and Professional Women's Clubs, and others.

Why are the women kicking up a fuss? One reason is the gradual but continual upgrading of women to more important responsibilities in engineering and in management. Another is the California light-manufacturing industry phenomenon, where women—because of the light tasks involved—work alongside men on the production line doing essentially the same jobs as men. But towering over all other reasons is the tremendous increase in the number of women workers in California industry.

Take a look at these statistics: The manufacturing industry now ranks third in the number of women employed in California. At the peak season, 288,300 women worked in manufacturing plants last fall, with an average number of 261,700 for the year. In 1940, only 70,000 women worked in manufacturing. Therefore, there has been an increase of 270% in the last 15 years.

According to the Industrial Welfare Commission, this great increase perhaps explains why there is now such a high percentage of violations of the state's laws and orders governing women's employment. In 1955 alone, 1,305 manufacturing firms were inspected and an astonishing 75% were found to be in violation of the laws on one or more counts. (In case you're worried about your compliance with the laws, you should note that 893 of the 1,305 firms were found to be not in compliance with the record keeping requirements, and 348 were in violation of the Eight Hour Law.)

WOMEN

MEN

BEHIND THESE DOORS

If you believe your company's rest rooms can never again look spotless, gleaming and unstained, it's time to call an Easterday Sanitation Consultant. He will prove to your janitors, by demonstration on the job, that proper application of our scien-

tifically formulated materials will work wonders. And they are competitively priced. Phone your nearby Easterday office about any of your cleaning headaches. The consultant will demonstrate at your convenience, no obligation.



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Twelve Pacific Coast Warehouses Providing
Everything for Sanitation and Maintenance

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Send me **FREE** Easterday Catalog. I also
want information on: ☐ Floor Cleaning
☐ Plant Areas ☐ Rest Rooms. Other _____

Name _____

Firm _____

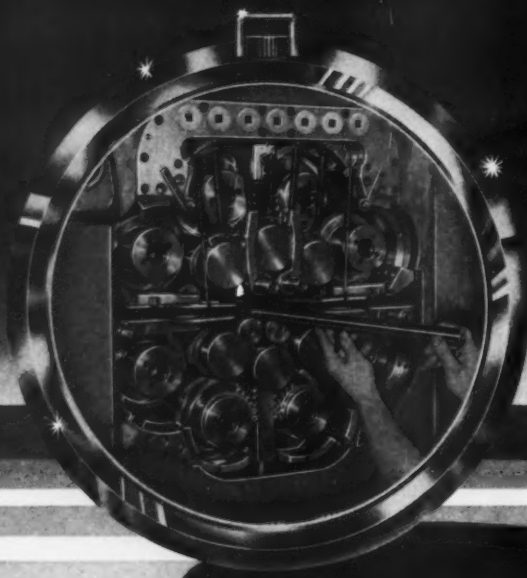
Position _____

Address _____

City _____ State _____

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Calstrip® rolls strip steel to really close tolerances



**Extra Close Tolerance Strip
comes off our new
Sendzimir Mill
like seconds ticked off
by a Fine Watch.**

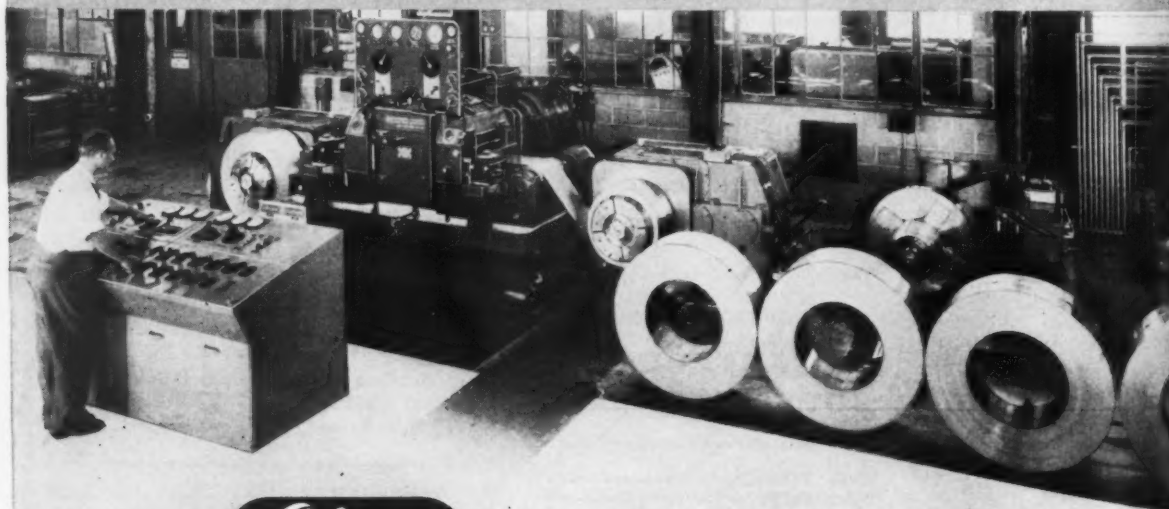
The precision made Sendzimir Mill
with its smooth, quiet operation can be
compared to an expensive timepiece.

The cluster of rolls and backing bearings shown in the inset are enclosed in a solid, one-piece housing. This means that roll deflection is eliminated and the strip is uniformly "on gage" across the full width of the strip being rolled—no heavy center or crown.

Work rolls are changed by hand in a few seconds. Rolls with the right finish and with the proper shape can be easily installed for each order—or for each coil. Our new roll grinder holds tolerances close as .0001" on these rolls.

This fine equipment employed at Calstrip, Los Angeles, has one purpose—to produce for you the special quality strip steel required today for the *high speed* manufacture of products that are stamped, formed, or drawn.

Call or write us today; let us know about your requirements for low carbon, spring, and alloy steels. Your products will function better, will look better, and can be produced at lower cost, if they are made from Calstrip steel.



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Calstrip®

"The West's First Cold Rolled Strip Mill"

STEEL CORPORATION

7140 BANDINI BOULEVARD • LOS ANGELES 22, CALIFORNIA

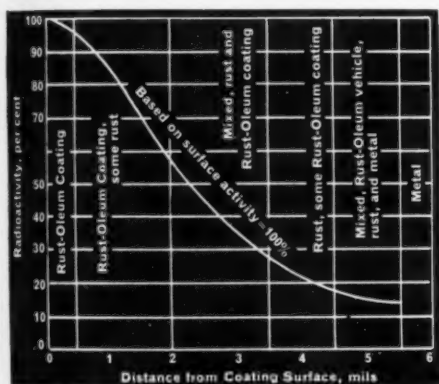
RUST-OLEUM[®] PENETRATES

rust... to bare metal!

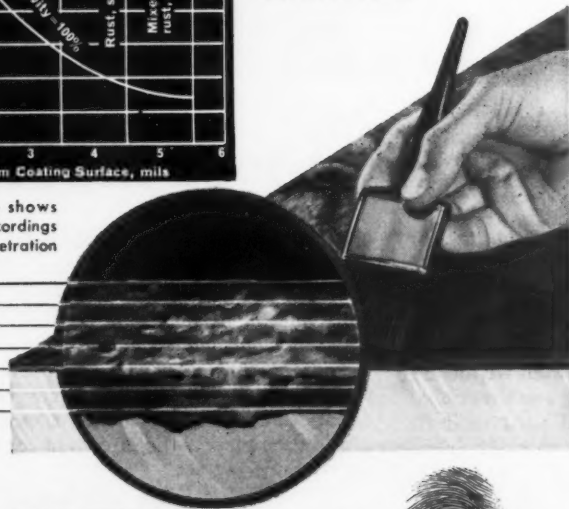
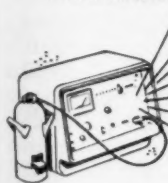
To stop rust, the vehicle of a protective coating, when applied over sound rusted surfaces, must *penetrate* through rust to bare metal. Rust-Oleum does exactly that—as proved by radioactive tracing! Rust-Oleum's specially-processed fish oil vehicle was radioactivated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Penetration *through rust* by Rust-Oleum's specially-processed fish oil vehicle was then traced by Geiger Counter.

You stop rust, because Rust-Oleum's

fish oil vehicle *penetrates* to bare metal and into the tiny pits where it drives out air and moisture. You save money, because you can apply Rust-Oleum directly over sound rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your business letterhead for thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



Curved chart line shows Geiger Counter recordings of Rust-Oleum penetration at each mil level.



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2529 Oakton Street, Evanston, Illinois

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See our Catalog in Sweets, or write for complete information.

There is only one Rust-Oleum—it is distinctive as your own fingerprint.



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Nearest Rust-Oleum Distributor Shown at Right.

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☐ Thirty-page report on Rust-Oleum penetration.

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Ralphs-Pugh Co., Inc.
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Phone: SUtter 1-6505
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2600 S. Eastland Ave.
Los Angeles
Phone: Parkview 8-7151
Republic Supply Co.
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San Leandro
Phone: LOCKhaven 2-0414
Sacramento Rubber Co.
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Phone: Gilbert 2-3847
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Ft. Morgan
Phone: 475
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Denver
Phone: ALpine 2091

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Casper
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Ask the man who moves mountains

Without him no structure, no road, no dam or development could happen. He whittles the earth into usable shapes with a fine steel blade. He smooths a way for progress.

NEW OILS FOR POWER

All these works are done with power, which we mostly take for granted. But there is nothing *indestructible* about it. On the contrary: the life of your modern diesel engine depends, literally, on very special lubrication! That's why Caterpillar Tractor Company has announced the need for a *new class* of oils—Superior Lubricants, Series 3, for diesel engines. They show

many advantages over the older Series 2 oils which some people still use.

One of the *first* to meet these stiff specifications is Richfield's SUPER Circle C brand of motor oil. It is now recommended for use in a score of Caterpillar engines and noticeably improves the operation of many other makes. It reduces wear, lessens maintenance and parts replacement, keeps the engine cleaner and counteracts the effects of high sulfur fuels found here in the West.

PICK UP YOUR TELEPHONE

Arrange for a trial of Richfield SUPER Circle C Motor Oil. As any man who moves mountains will tell you, it gives *new life* to diesel engines!

FREE!

Send for your copy of our new Illustrated Diesel Lubricating Guide. Address Richfield, Lubricants Dept., 555 So. Flower St. Los Angeles 17, California

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THE ADVANCED MOTOR OIL

FINE INDUSTRIAL LUBRICANTS FOR EVERY NEED

RICHFIELD

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WESTERN INDUSTRY — September 1956

Sergeant Sticky Says...

"This Case is Closed ...



...and stays closed
with **FLASH-TITE**™

Any case is really closed when it's sealed right—with Flash-Tite! Flash-Tite gummed tape grabs fast and holds fast . . . yet allows time for smoothing and applying around corners. Made of sturdy kraft for rugged tear-resistant protection, Flash-Tite is the fast, sure way to keep your cases and cartons securely sealed—from shipping point to final destination.

FLASH-TITE. GUMMED TAPE

Another quality product by



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September 1956 — WESTERN INDUSTRY

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25



Look to your AIM*... Graning Enameling did...
Steel strapping idea doubles packing rate

Acme Idea Man,
 John Everett,
 Los Angeles,
 introduced this
 strapping system
 to Graning
 Enameling Company



GRANING ENAMELING COMPANY, El Monte, California, combined a packaging idea with a new Acme Steel machine to make important savings in time, weight and dunnage (Idea No. S4-1).

Sinks and laundry trays, on wooden bases, are conveyed to the strapping machine. The F-1 machine, automatically tensions, cuts and seals steel straps, in a few seconds.

Previously, two shifts were required to handle the high volume now packaged by one man. The F-1 is easy to operate, assures greater product protection, less worker fatigue.

***Look to Your Acme Idea Man** for time and money-saving packaging and shipping ideas. Just call the nearest office, or write: Dept. WCS-96, Acme Steel Products Division, Acme Steel Company, 4901 Pacific Blvd., Los Angeles 58, Calif. San Francisco, Seattle, Portland.



STEEL STRAPPING

... for more details, circle No. 21 on Reader Service Postcard
WESTERN INDUSTRY — September 1956

Gets MORE

Powerful break-out bucket action with two double-acting hydraulic rams helps "work" the bucket into tough materials and tips bucket back 40° at ground level to get bigger loads with less spillage.



Keeps MORE

Heaped loads are cradled closer to the machine for greater stability and can be carried at lower level. Exclusive load shock-absorber cushions the load during travel, smooths out the ride, and permits faster movement with less spillage.



Delivers MORE

Since you get MORE to begin with and keep MORE while traveling at higher speeds... with less spillage in both instances... the result—you deliver MORE. "PAYLOADER" design handles more yardage at lower cost.



"PAYLOADER" illustrated is the Model HAH—1 cu. yd. capacity

More Productive Capacity

"PAYLOADER" units have proven time after time that they can deliver more material, faster, at lower cost. It is this productive superiority, plus durability, that has made "PAYLOADER" the choice at thousands of plants. Whether you want to unload boxcars or move "mountains" of materials, indoors or outdoors, there's a size and type of proven "PAYLOADER" to do the job. There is also a nearby Distributor ready to serve you right.



PAYLOADER®

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THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
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601 Sunnyside Ave., Libertyville, Ill.

Send "PAYLOADER" information as follows:

- ☐ Front-wheel-drive — to 1 cu. yd.
- ☐ Rear-wheel-drive — to 1½ cu. yd.
- ☐ Four-wheel-drive — to 2¼ cu. yd.

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Title _____
Company _____
Address _____
City _____
State _____

... for more details, circle No. 22 on Reader Service Postcard



ENGINEERING LEADERS are being elected this time of year by the many Western chapters of associations, societies, and institutes. Here's the latest on Western engineers who have been chosen to headup activities of a few of these nuclei of knowledge.

Two Southwestern chapters of the Society of Packaging & Materials Handling Engineers have cast ballots on 1957 officers. *Harold A. Kilmer*, supervisor of package engineering for the missile development division of North American



HAROLD KILMER, package engineering supervisor at North American, is the new president of So. Calif. SIPMHE chapter.

Aviation, is newly-elected president of the Southern California chapter of SIPMHE, *J. D. Nunn*, Lockheed Aircraft Co., is executive vice president, *Noble Jones*, Bekins Industrial Packaging, is vice president on the materials handling side of the organization, *Harry Lamar*, North American Aviation, is vice president on the packaging side, and *N. R. Christensen*, Key Container Co., secretary.

Heading up SIPMHE's brand new Arizona chapter, which draws chiefly from the Phoenix-Tucson area, is



RUSSELL CARR (right) accepts the president's gavel for new Arizona SIPMHE chapter from **C. J. Carney, Jr.**, national managing director of the organization.

Russell M. Carr, Arizona Public Service Co. About 40 protective packaging and materials handling specialists from Arizona plants attended the recent organization meeting.

Also elected to a pro-tem position by the group was *G. A. Peters*, Reynolds Metals Co., who will serve as secretary.

American Society of Mechanical Engineers' Southern California section elected *Frank J. Fontana*, chief engineer for the refining division of Richfield Oil Corp., as chairman for the 1956-57 term, *Shuman H. Moore*, district manager for Foster Wheeler Corp., as vice chairman, and *George E. Hallen*, engineer, Offco Construction Co., secretary-treasurer.

Powdered metal fabricators, banded by the Western Powdered Metal Fabricators Assoc. in Los Angeles, balloted *Al Williams*, Ceromet, Inc., into its chairman seat, *R. Remington*, Picco, Inc., to the vice chairman slot, and *O. R. Bowen*, Asco Sintering Co., as secretary.

President-elect for AIEE, San Francisco-Oakland Chapter, (American Institute of Industrial Engineers) is *Robert L. Knighton*, market analyst with United States Steel's Columbia-Geneva Div. Other officers recently installed for the 1956-57 term are *James M. Buckwalter*, Butler Manufacturing Co., vice president; *W. A. Hecht*, United Air Lines, secretary; *John G. Ochsner*, Pacific Coast Engineering Co., treasurer.

OF INTEREST TO TWO-HATTED WI READERS are two management training programs slated for San Francisco and Los Angeles. If you devote several quick-change moments a day to the switch from plant operator to management man (as is true of many of our small plant readers), donning the management derby and attending any or all of these sessions will give you many valuable pointers.

The Institute of Management Sciences plans a two-day international meeting at the Hotel Statler in Los Angeles Oct. 18-19. Technical papers to be delivered, according to program chairman *George Kozmetsky* of Litton Industries, Beverly Hills, Calif., will include such topics as "Industrial application of linear programming," "Management sciences and logistics," "Advanced techniques in management science," "Behavioral sciences and management," and many others.

A back-to-school movement planned by the **American Management Assoc.** to extend through the 1956-57 fiscal year is underway. The educational program will consist of some 700 meetings—better than a 30% increase over last year's activity. Los Angeles and San Francisco, Calif., will be Western locations of conferences, seminars, and courses in the program. Phases of plant management ranging from cost reduction to "high finance" and marketing will be covered.

See the listing below for contact information.

WESTERN MEETINGS YOU SHOULD PLAN TO ATTEND

Sept. 17-21—AMERICAN SOCIETY FOR TESTING MATERIALS, 2d Pacific Area National Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles. Contact Bert Folda, chairman, promotion and publicity committee, c/o General Petroleum Corp., Box 2122, Terminal Annex, Los Angeles 54.

Sept. 17-21—SYMPOSIUM ON RADIATION EFFECTS ON MATERIALS, sponsored jointly by Atomic Industrial Forum and American Society for Testing Materials, Los Angeles. Contact ASTM, 1916 Race St., Philadelphia 2, Pa.

Sept. 19-21—PORCELAIN ENAMEL INSTITUTE, INC., 25th annual meeting, The Broadmoor, Colorado Springs, Colo. Contact Porcelain Enamel Institute, 1145 19th St. N.W., Washington 6, D. C.



VENTILATION BY COLT

AN ANNOUNCEMENT OF IMPORTANCE to economy-minded management

It is an undisputed fact that comfortable working conditions boost workers' morale and efficiency, yet many employers hesitate to install a proper ventilating system because of the cost of installation and upkeep. Now, *for the first time in America*, Colt has made available its unique system of NATURAL VENTILATION—developed in England to combat the fuel and power shortage—which gives PERFORMANCE EQUAL TO A MECHANICAL SYSTEM, *at much lower initial cost*, plus NO RUNNING OR MAINTENANCE COST!



Dunlop Rubber Company, England, showing fully controllable ventilation system of natural roof extraction by Colt SRC 2046 Controllable High Duty Roof Extractor Ventilators with air inlet by Colt Mechanical Inflow Units. Half a million cubic feet of air are moved per minute, without motors, wiring, noise, or running costs!

Colt clear opening ventilators are installed in the boiler house of De Havilland Aircraft Company in England. Installed during normal working hours without work interruption or structural changes. Since this installation, forty-four other contracts for Colt Natural Ventilation have been placed by De Havilland Co.

THE COLT SYSTEM OF NATURAL VENTILATION

- maximum efficiency
- low installation cost
- no maintenance necessary
- gravity, louver, and inflow type
- for roof or wall installation

Complete engineering service free and without obligation!

A FREE MANUAL with full specifications of the wide range of Colt Ventilators is available upon request.

COLT VENTILATION OF AMERICA, INC.

4652 Hollywood Boulevard • Los Angeles 27, California
Telephone: NOrmandy 1-0261

... for more details, circle No. 23 on Reader Service Postcard

CONTROL CABLE

WELDING

TYPE G

TYPE W

FLAT TWIN PARALLEL

BRONCO 66

ELECTRICAL WIRE & CABLE **CERTIFIED**

POWERS

the MUSCLES of INDUSTRY

WRITE for complete story of BRONCO 66 CERTIFIED, the cable with 67.32% Neoprene in the jacket!

To: Western Insulated Wire Co.
Los Angeles 58, California

Please send me your free brochure describing Bronco 66 Certified.

NAME _____ TITLE _____

COMPANY NAME _____

ADDRESS _____

New! **BRONCO** Certified 66

... for more details, circle No. 24 on Reader Service Postcard
See Directory listing page 104

WESTERN MEETINGS

... continued
from page 28

Sept. 21-22—PACIFIC-INTERMOUNTAIN PURCHASING AGENTS, 10th conference, Hotel St. Francis, **San Francisco**. Contact Edward Chambers, executive secretary, 461 Market St., San Francisco.

Sept. 23-29—NATIONAL ASSOC. OF ELECTRICAL CONTRACTORS, national convention, **San Francisco**. Contact Clint J. Harder, secretary-treasurer, 1200 18th St., N.W., Washington 6, D. C.

Sept. 26-28—AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS, third annual Rocky Mountain Minerals Conference, Newhouse Hotel, **Salt Lake City**. Contact R. B. Coleman, 600 W. 33rd So., Salt Lake City, Utah.

Oct. 1-4—AMERICAN MINING CONGRESS (Metal Mining-Industrial Minerals Convention and Exposition), Shrine Exposition Hall, **Los Angeles**. Contact American Mining Congress, Ring Bldg., Washington, D. C.

Oct. 16-18—36th PACIFIC COAST MANAGEMENT CONFERENCE, Claremont Hotel, **Berkeley, Calif.** Contact California Personnel Management Assoc., 2180 Milvia St., Berkeley.

Oct. 18-19—INSTITUTE OF MANAGEMENT SCIENCES, third annual international meeting, Hotel Statler, **Los Angeles**. Contact Crosby M. Kelly, publicity chairman, Litton Industries, Inc., 336 N. Foothill Rd., Beverly Hills, Calif.

Oct. 31-Nov. 1—1956 WESTERN AREA DEVELOPMENT CONFERENCE, "Resources for Industrial Expansion" theme, co-sponsored by Stanford Research Institute and Confederación de Camaras Industriales de los Estados Unidos Mexicanos (a Mexican industrial association), Hotel Westward Ho, **Phoenix, Ariz.** Contact Charles L. Hamman, Assistant Director, Economics Research, Stanford Research Institute, Menlo Park, Calif.

Nov. 1-3—NEW MEXICO MINING ASSOC., convention, **Carlsbad, N. Mex.** Contact J. B. Knaebel, president, P. O. Box 1125, Santa Fe, N. Mex.

Nov. 9-10—AMERICAN IRON & STEEL INSTITUTE, regional convention, **San Francisco**. Contact Frank Raglan, secretary, 350 Fifth Ave. New York, N.Y.

Nov. 12-13—THIRD WEST COAST NOISE SYMPOSIUM, Institute of Aeronautical Sciences Auditorium, 7660 Beverly Blvd., **Los Angeles, Calif.** Contact Greater Los Angeles Safety Council, 610 So. Main St., Los Angeles 14.

Nov. 12-14—PACIFIC LOGGING CONGRESS, **San Francisco**. Contact Carwin A. Woolley, 1222 American Bank Bldg., Portland 5, Ore.

Nov. 30-Dec. 1—NORTHWEST MINING ASSOC. CONFERENCE, Davenport Hotel, **Spokane, Wash.** Contact Karl Jasper, Radio Central Bldg., Spokane.

1957

Mar. 4-6—ASSOC. OF IRON & STEEL ENGINEERS, regional convention, **San Francisco**. Contact J. T. Ess, managing director, 1010 Empire Bldg., Pittsburgh 22, Pa.

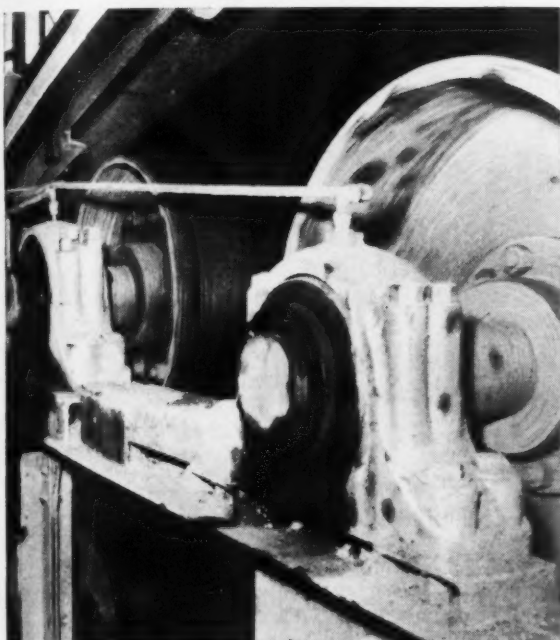
Standard Engineer's Report

CASE HISTORY

Calol EP Roller Grease
LUBRICANT

Pacific Coast Aggregates Inc.,
FIRM *Pleasanton, Calif.*

No bearings lost in 4 years of gritty conditions!



300 CONVEYOR-DRIVE BEARINGS LIKE THESE, lubricated with Calol EP* Roller Grease, have run 4 years without a single failure due to lubrication, in extremely tough working conditions at Pacific Coast Aggregates' Eliot Plant.

Conveyors carry wet sand and gravel from washer to storage areas. Water, sand, and fine grit collect around bearings as shown above. But even in service like this, Calol EP Roller Grease withstands wash-in action of water, seals out virtually all grit, tends to carry out any abrasives that do get into bearings.

Calol EP Roller Grease pumps easily even on cold winter mornings, allows conveyors to operate all year 'round in all types of weather.

(*EP—Extreme pressure.)

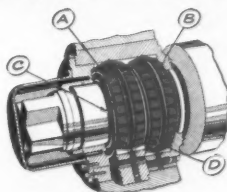
FREE CATALOG: "How to Save Money On Equipment Operation," will be sent on request to Standard Oil Company of California, 225 Bush St., San Francisco.

FOR EXPERT HELP on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative, or write to 225 Bush Street, San Francisco.



TRADEMARK "CALOL" REG. U. S. PAT. OFF.

How Calol EP Roller Grease protects heavy-duty anti-friction bearings

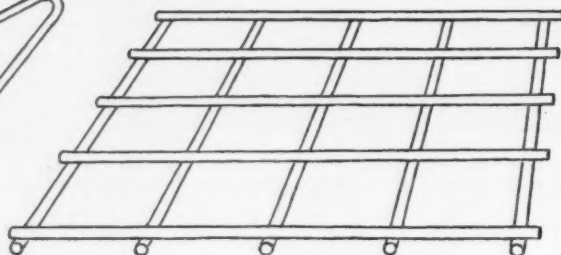


- A. Contains extreme pressure additives—lubricating film will not squeeze off under heaviest loads.
- B. Highly water-resistant—sticks on bearings even where excessive water used for cooling.
- C. Feeds slowly and evenly—creeps into small clearances and assures good lubrication. Pumps easily at low temperatures.
- D. Corrosion inhibitor protects metal. Will not harm neoprene and plastic seals.

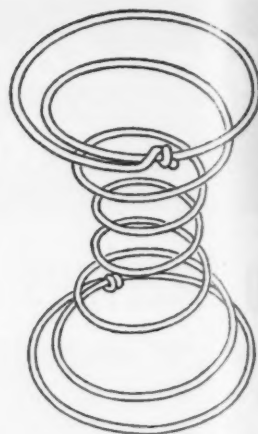
STANDARD OIL COMPANY OF CALIFORNIA



COAT HANGERS

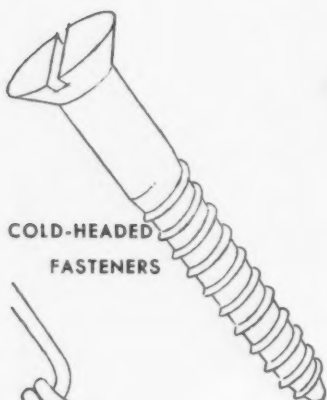


WELDED MESH

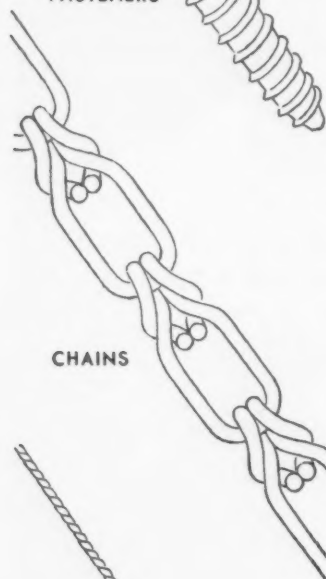


UPHOLSTERY SPRINGS

Each calls for a different type of wire



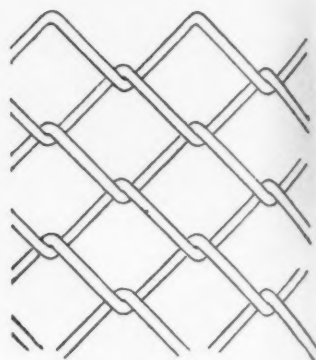
COLD-HEADED
FASTENERS



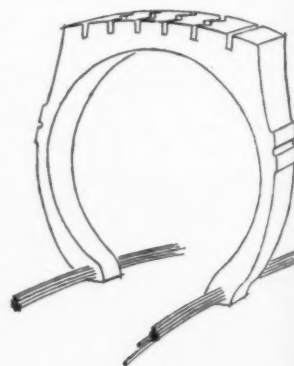
CHAINS



KITCHEN GADGETS



CHAIN-LINK FENCE



TIRE BEADS

Steel wire has almost countless uses. But it usually takes a special-purpose grade of wire to do each job best. That's why we regularly produce a wide range of grades and types in our modern wire mill in Los Angeles. Each is individually processed to give it the tensile strength, surface finish, and other characteristics required to make a clothes pin spring, a paper clip, or a barbecue grill.

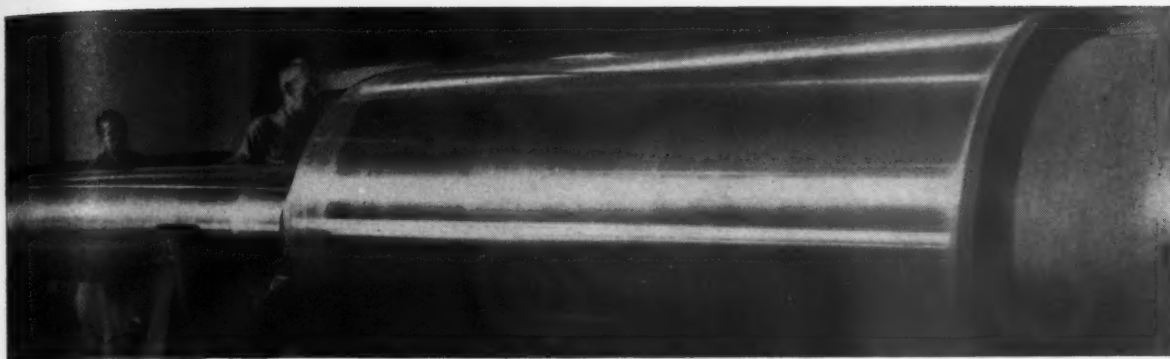
Whether you need bright or galvanized wire, low- or high-carbon analysis, we're ready to furnish the grade and quality that's just right for your product. One of our wire specialists will gladly talk over your wire needs. Just phone or write one of our sales offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, and Spokane.

BETHLEHEM PACIFIC COAST STEEL
CORPORATION

BETHLEHEM PACIFIC



... for more details, circle No. 26 on Reader Service Postcard
WESTERN INDUSTRY — September 1956



40-ton hydraulic press ram was rebuilt with a ton of special stainless steel and precision-machined to close tolerances.



30-ft. vacuum table for skin mill was cast, fabricated, machined and assembled—with all controls installed.

Need a reliable source for SPECIAL steel products?

Every product on this page is from National Supply's Torrance plant—the largest completely integrated machinery manufacturing plant in the West.

Each is typical of the many big, specialized jobs we handle daily—for customers throughout western industry. Complete facilities, engineering skill and experienced plant operators are the vital ingredients we bring to every job assignment. May we use them for *your* special steel product needs?



4-shaft gear box assembly, a National job from design to delivery, was built for a gear speed ratio of 543 to 1.

7,000-lb. alloy steel cone forging was easily handled on a special mandrel and finished to the customer's specifications.



THE
**NATIONAL
SUPPLY**
COMPANY

INDUSTRIAL PRODUCTS DIVISION

Torrance, California • Los Angeles Area

Ideal Pressed Steel Forgings • Billets and Large Bars
Steel Castings and Special Machinery
Melting • Forging • Casting • Machining • Heat Treating
Assembling • Welding • Testing

... for more details, circle No. 27 on Reader Service Postcard



Through an intricate process by which once wasted wood is transformed into pulp and then dried and pressed into a finished paperboard product, Western Kraft Corp., near Albany, Ore., daily turns out literally miles of linerboard for the manufacture of kraft corrugated boxes.

In this process are many machines of varying size and operating conditions ... each is protected by Mobil lubricants recommended by General Petroleum's lube engineers when the first switch was turned at Western Kraft in 1955.

Manufacturing plants all over the West have found it's good business to deal with General Petroleum, a company backed by more than 90 years experience in serving industry with *dependable* lubricants and *personal* service. Prove it for yourself ... call your nearest G.P. office today.

General Petroleum Corporation

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WESTERN INDUSTRY — September 1956

For more details, adv. opp. pg., circle No. 29 on Reader Service Postcard

ABOUT

THE CHALLENGER is a ruggedly built, 1/2 ton capacity, battery operated hydraulic lift truck.

It is built by BIG JOE Manufacturing Co. . . manufacturer of a complete line of over 40 IBH* lift trucks. Guaranteed of the finest quality materials and workmanship money can buy. To our knowledge it is the only battery operated lift truck priced under \$400.

THE CHALLENGER is an ideal IBH tool—"In Between Handling"—The short distance hydraulic manipulation of materials too heavy for manual handling yet not requiring high priced power-driven equipment.

Only BIG JOE lift trucks carry the "IBH" label—because BIG JOE originated and have continuously built the complete line of all "In Between Handling" machines. One man can operate **THE CHALLENGER** . . . it is easy to push . . . effortless to raise, lower and spot loads.

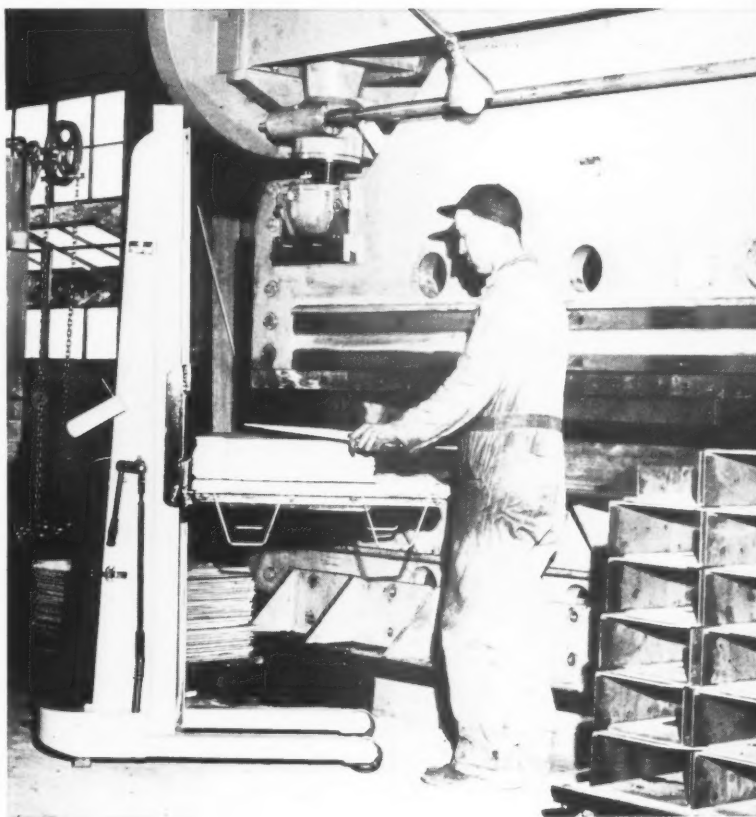
It is ideally suited for **FLEET OPERATION** in large plants . . . and for the entire materials handling job in small plants.

You receive maximum returns for capital investment . . . eliminate need for skilled labor and central control.

A single **CHALLENGER** in each department pays for itself quickly *by just being available when needed* . . . because lost production time means lost profits.

'397.50 "We invite comparison"

"THE CHALLENGER" BIG JOE and IBH*



BIG JOE MANUFACTURING CO.

Without cost or obligation please send me

- ☐ The IBH* handbook
- ☐ Your catalog on the BIG JOE lines
- ☐ We prefer to sell ourselves! Send over a "CHALLENGER" for a day or a week for free trial in our plant.
- ☐ Have your salesman call.

NAME _____

TITLE _____

ADDRESS _____

- ✓ Complete Bearing Control Throughout
- ✓ Self-Aligning Dual Floor Brakes Actuate on Uneven Floors
- ✓ Synchronized 12-volt Heavy Duty System
- ✓ Self-Contained Charger and Tapered Current Control
- ✓ Filtered Hydraulic Pump Assembly Provides Volumetric Efficiency Over Wide Temperature Range
- ✓ Throttle Valve Control Assures Smooth Accurate Stops

Over 40 models to choose from.

Capacities to 2,000 pounds, lifting heights to 130 inches.



The Challenger will be demonstrated in your plant upon request. See it, try it for a few days on your own jobs without obligation.

WRITE FOR BIG JOE's IBH* Handbook which shows how to solve your In-Between Handling Problems.

BIG JOE MANUFACTURING COMPANY
Wisconsin Dells,
Wisconsin

FIRST CLASS

Permit No. 29199
(Sec. 34.9 P.L. & R.)
Los Angeles 22, Calif.

Via Air Mail

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No postage stamp necessary if mailed in the United States

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5141 Telegraph Road
Los Angeles 22, California

Mail This Card

Fill out the attached airmail reply card to obtain full information on the CHALLENGER, or any other BIG JOE fork lift truck. Their many "In Between Handling" uses and advantages . . . how they work . . . how easily they are maintained.



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Se

Johns-Manville organizes to give you better insulation service

*New and separate insulations division created to
provide industry greatly improved Sales and
Engineering service to meet modern problems*

• Johns-Manville is now concentrating all industrial insulation operations within a new, fully integrated insulations division. This greater specialization makes possible the most complete insulation service available to industry. It consists of—



As co-ordinator of J-M's extensive research-engineering-manufacturing facilities, he offers you outstanding insulation training and experience.



Sales Representatives . . . men on whom you can rely for your insulation recommendations. Your J-M salesman will help you select the insulating material exactly right for your job—the one that will provide maximum fuel savings, improved process control, and minimum maintenance.

Insulation Engineers—Backing up the J-M salesman on every job is the J-M insulation engineer. He is primarily concerned with solving insulation problems. He recommends the economic thickness of insulation, as well as the

proper finishes, weatherproofing and securement. His highly specialized knowledge makes possible an intelligent recognition and handling of your individual insulation requirements.

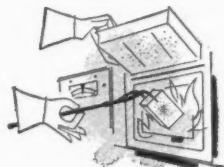


Insulation Contract Units . . . Fully aware that no insulation is better than the man who applies it, the J-M Insulation Contractor makes care and skill in the scientific application of Johns-Manville insulations his stock in trade. He maintains a complete crew of

estimators and mechanics trained in J-M application techniques. He is ready to give you fast, efficient service on any insulation job—large or small. Proud of his reputation for integrity in his own community, the J-M Insulation Contractor merits your complete confidence.



from the finest grades of asbestos, magnesium carbonate, diatomaceous silica, refractory clays and ceramic fibers, they are designed to afford maximum insulating effectiveness and durability at operating temperatures ranging from minus 300F to plus 3000F.



In addition, their technical knowledge is always available to J-M customers whose insulation problems require special study.



to serve you . . . now, and in the future.

On Your Next Insulation Job—Whether your next insulation job is big or little, simple or complex, let Johns-Manville handle it for you. Just call your nearest J-M sales office, or write direct to Johns-Manville, Box 14, New York 16, New York. In Canada, Port Credit, Ontario. *Chances are, you'll be glad you did!*



Johns-Manville *first-in* **INSULATION**
MATERIALS · ENGINEERING · APPLICATION

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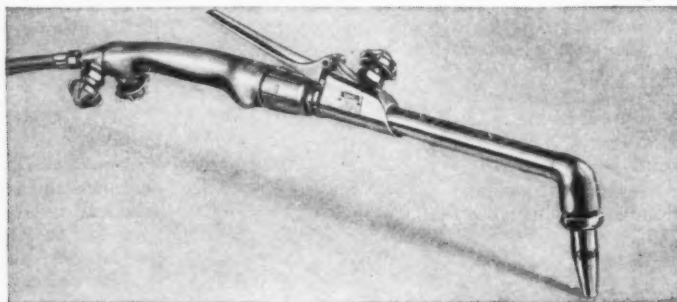
ONE wide-range
"OXWELD" W-45 BLOWPIPE
Trade-Mark
handles EVERY welding
and heating job

**NO OTHER SINGLE BLOWPIPE OFFERS
 THIS EXTENSIVE RANGE!**

Anyone whose daily work includes welding and heating will readily appreciate the amazing wide range and versatility of the new OXWELD W-45 Blowpipe. Its 18 head sizes (2 to 300 cu. ft. per hr. capacity) provide a perfect flame for every metal thickness. Light sheet to heavy plate, *one blowpipe does it all!*

From chrome-plated tip to offset hose connections, the W-45 shows the results of over a decade of development work by LINDE engineers. Its exclusive "jiffy-lock" heads, "form-fit" handle, and advanced styling are as modern as guided missiles and atomic power. "O" ring gas seals, flame-stabilizing mixers of improved type, and many other innovations put this blowpipe far ahead of the field in economy, ease of operation, and low-cost maintenance.

See for yourself how you can enjoy tomorrow's operating standards today with an OXWELD W-45 Blowpipe. Ask your LINDE representative for a demonstration, or write for free booklet, F-8684.



W-45 Cutting Attachment adapts the W-45 Blowpipe for cutting steel up to 8 inches thick.



Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street **UCC** New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY
 Division of Union Carbide Canada Limited, Toronto
 (formerly Dominion Oxygen Company)

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

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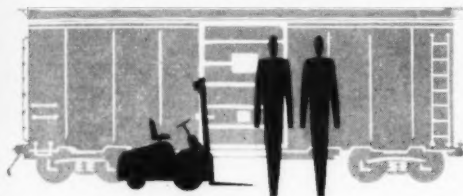
WESTERN INDUSTRY — September 1956



Car loading and unloading time cut 90% with Sleeve-A-dore Expendable Pallets

Here's PROOF!

A. 40 tons of case goods, steel-strapped on Sleeve-A-dore pallets.

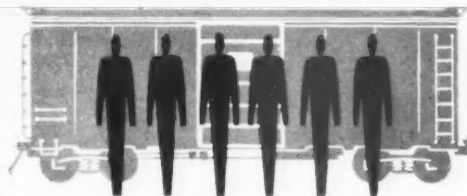


When these two men with a forklift had emptied this car



1 2/3 MAN HOURS

B. Same load — 40 tons of identical case goods, not palletized.



these six men, unloading by hand, still had 3/4 of the car to unload!



19 1/2 MAN HOURS

This was an actual shipment of standard case goods, set up this way to obtain solid facts on handling time. Put in another way, the two men could have unloaded 10 cars of Sleeve-A-dore-palletized goods while the six men were unloading one car of goods not so palletized.

Whether you're a shipper or receiver (and most firms are both) you can make substantial savings in handling by the use of Sleeve-A-dore Pallets. These new and different expendable pallets are strong—certified loading tests of 32,000 lbs. are in our files. They're light in weight for low shipping costs; are so inexpensive you can afford to discard them after one use. When used for handling in and out of warehouses, still further savings are possible.

For full information on this remarkable new materials handling aid, fill out the coupon today—or get in touch with our sales agent.



Sales Agent for California and Hawaii — **EVJU PRODUCTS CO.**
World Trade Center Ferry Bldg. 6829 Rita Ave.
San Francisco 11, Calif. Huntington Park, Calif.

PALLET DEPARTMENT
GREAT LAKES CARBON CORPORATION
612 So. Flower St., Los Angeles 17, Calif.

Please send information on Sleeve-A-dore pallets

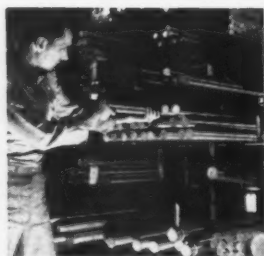
Name _____
Position _____
Company _____
City _____ Zone _____
State _____

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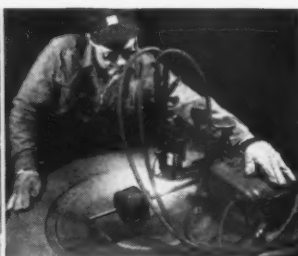


NOTE ON PRIORITY RATINGS—When your stainless requirements are covered by a rating, please be sure to extend it on your order to Ryerson. You will be helping yourself by helping to assure future availability of nickel-bearing stainless from Ryerson stocks. Shown here: One Ryerson plant's stainless sheet section.

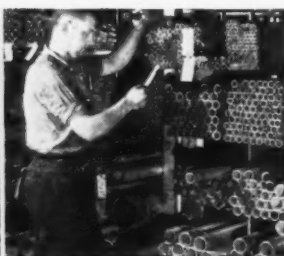
for STAINLESS, call Ryerson...



Ryerson stainless bar stocks include free-cutting types, aircraft quality bars—many others.



Any shape can be accurately flame cut from stainless plate with special Ryerson plate burning equipment.



More than 300 miles of stainless pipe and tubing are on hand at Ryerson. Size range: $\frac{1}{8}$ " through 8 $\frac{1}{2}$ " O.D.



Felt pads on Ryerson shears protect the beautiful finish and flatness of Allegheny stainless sheets during cutting.

here's why: your call to Ryerson connects you with the nation's largest stocks of stainless steel—2,351 sizes, shapes, types and finishes of time-tested Allegheny stainless—carried in tonnages that assure prompt shipment of your warehouse requirements.

... you get the benefit of Ryerson's long experience with stainless—30 years of it,

dating from the days when Ryerson pioneered as the first supplier of stainless from stock. All we've learned in that time is at your command when you want help on problems of stainless application or fabrication.

RYERSON STEEL

PRINCIPAL PRODUCTS: CARBON, ALLOY AND STAINLESS STEELS • MACHINERY & TOOLS • INDUSTRIAL PLASTICS, ETC.

JOSEPH T. RYERSON & SON, INC., LOS ANGELES—Plant: 4310 E. Bandini Blvd. Mail: Box 3817, Los Angeles 54. Phones: ANGelus 2-6141, from San Diego (no toll) Zenith 6660. SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 188, Emeryville, California. Phones: OLYmpic 3-2933, Douglas 2-4211. SEATTLE—Plant: 1200 4th Ave., South. Mail: Box 3525, Seattle 24. Phone: Seneca 2300. SPOKANE—Plant: North 207 Freya St. Mail: Box 2158, Spokane 10. Phone: Keystone 3-1581.

... for more details, circle No. 33 on Reader Service Postcard

WESTERN INDUSTRY — September 1956



SEPTEMBER 1956 plant power issue & buyers' directory

No more appropriate time could be chosen

... for this, WESTERN INDUSTRY's first Plant Power Issue and Buyers' Directory. Today, the exacting power requirements of modern production equipment are necessitating rapid-fire refinements in industrial power set-ups—often creating painful difficulties for plant operating men in keeping abreast of the latest power product developments. During 1956, because industrial plants are using *outmoded* power systems and equipment, and because of the *misapplication* of power equipment by inadequately informed plant operating men, millions of dollars are being dissipated annually in the U. S.

Nowhere are these challenges felt more keenly right now than in the West. For the past few years, with market demands for industrial and consumer products consistently outstripping the West's productive capacity, hundreds of small plants have rushed new facilities here and hurriedly set up production lines, while existing Western plants typically today announce new expansion plans before present ones are consummated.

It is no wonder, therefore, that so many of the West's small plants, too embroiled in hectic presents to plan efficient tomorrows, are paying exorbitant penalties for inadequate and poorly planned power systems—and that rapidly expanding larger plants are constantly trying to take enough "time out" to modernize their power facilities and achieve the economies that will be desperately needed as the competitiveness of the Western market intensifies.

During past years, WESTERN INDUSTRY has continually devoted its columns to material describing those developments in power equipment and its utilization that have special importance for Western plant operating executives. Now, the annual issue you hold provides an expansion of this service in proportion to its current need.

Articles in this issue, covering many different phases of industrial plant power, have been prepared especially for the West—the authors are men who know the informational needs of WI readers because they spend every working day consulting with Western plant men on their power problems. Of major importance also in this issue are the two unusual sections reviewing today's best technical manuals on motor controls, and on gearmotors and speed reducers, available to you free.

And, of year-long importance to you in achieving soundly planned power systems improvement in your plant will be the 24-page Western Industrial Power Equipment Buyers' Directory, on pages 85-108, *the first such directory ever published* for the industrial West. Manufacturers of all types of plant power equipment—electrical, hydraulic, mechanical power transmission, etc.—are listed there, along with complete where-to-buy-it data for you in all 11 states of the Western region.



ANNUAL
PLANT POWER
ISSUE

Electrical ignorance can be murder

It is murder at the rate of 30 lives per year in California plants! Here's how these and less serious accidents were caused and how to avoid them in your plant, told by a Westerner who knows from field study.

ANALYSIS OF THE CHART on the opposite page should provide ample "drive-home" power—if any is needed—to encourage Western plant operators to initiate electrical safety programs, or beef up existing programs, in their plants. These figures were compiled by the California Department of Industrial Relations and cover only reported injuries resulting from exposure to electrical installations and equipment during one year in the state of California. Out of 978 accidents covered in the survey, 30 were fatal.

The only plant safety program that will reduce these figures drastically is a program that begins with the equip-

ment designer and is uppermost in the minds of the architect, the consulting engineer, the plant engineer, the maintenance staff, and the operator of the equipment. The two predominant items found in analyzing engineers' reports to the Division of Industrial Safety were unsafe mechanical or physical conditions and the unsafe act on the part of the person injured. Errors on the part of any one or several of the persons involved in equipment selection, installation or operation, and maintenance can cause either of these accident types.

AUTHOR OF THIS ARTICLE



E. E. CARLTON
Supervising Engineer
Division of
Industrial Safety
State of California
San Francisco, Calif.

Here are some of the major errors committed and some sharp thinking along the lines of avoiding them in each of these phases of electrical equipment usage.

Picking the right equipment

"Selection engineering" is the first point of emphasis for an effective in-plant electrical equipment safety program. Many of the accidents so vividly chronicled in the chart were caused because an inadequate piece of equipment had been selected to do the job or because the physical dimensions of the piece of equipment made it too large for the space available for installation. Thus, inadequate working room was left for operation or maintenance.

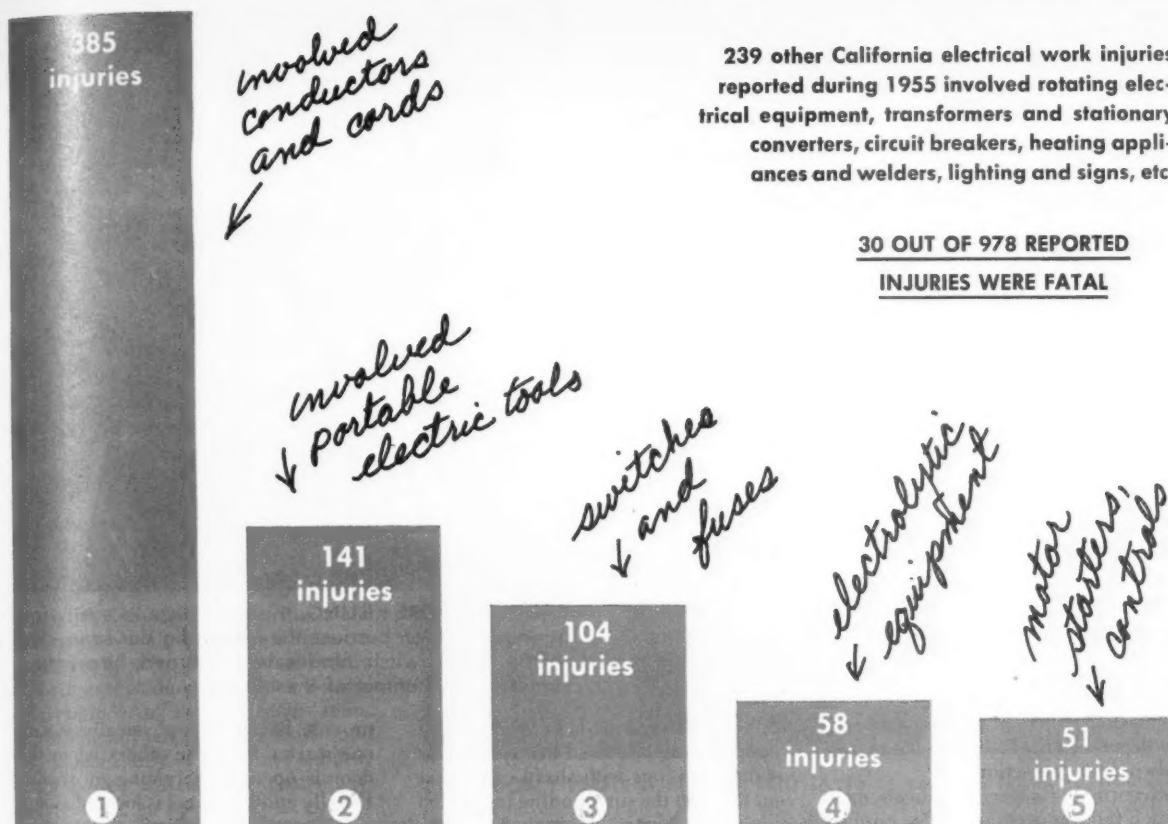
Misapplication of materials and devices presents many hazards in a distribution system. A material or device bearing an Underwriters' Laboratory label is often misapplied when used. The label means that a particular item has passed certain tests that have been incorporated into a standard by the laboratories. Such a standard is intended to provide a measure of quality and performance for comparing the same item made by different manufacturers. However, the laboratories cannot specify how such an item is used in the field. This is the responsibility of inspection authorities who are enforcing the electrical codes covering such uses and applications.

Switches are not motor controllers

Misapplication of switches causes many serious injuries. It is not unusual to find nonhorsepower-rated general use switches used not only as branch circuit disconnecting devices, but also as motor controllers. There is a large number of this type switch that fails each year when misused in this manner.

An example of such misuse was a 200-amp. nonhorsepower-rated switch used as a controller for a 40 hp., 440-v. motor. There was no regular motor

The appalling statistics presented in this article are based on 1955 electrical work injuries—updated one year over those used in Mr. Carlton's presentation of a paper on this subject at the recent AIEE convention in San Francisco. Our author bases his conclusions on years of field study of electrical work injury causes.



Here are the major causes of these 978 injuries

(Column numbers below correspond with bar numbers above.)

MAJOR UNSAFE-MECHANICAL-CONDITION INJURIES

Unsafe condition	1	2	3	4	5	Total
Insulation damaged, defective, insufficient.....	89	30	4	4	2	129
Broken, burned, wet, or damaged parts.....	47	9	18	—	5	79
Energized parts improperly guarded or shielded.....	31	—	6	2	7	46
Inadequate maintenance of equipment.....	28	23	5	—	7	63
Lack of grounding conductor...	12	26	12	1	—	51

MAJOR UNSAFE-ACT INJURIES

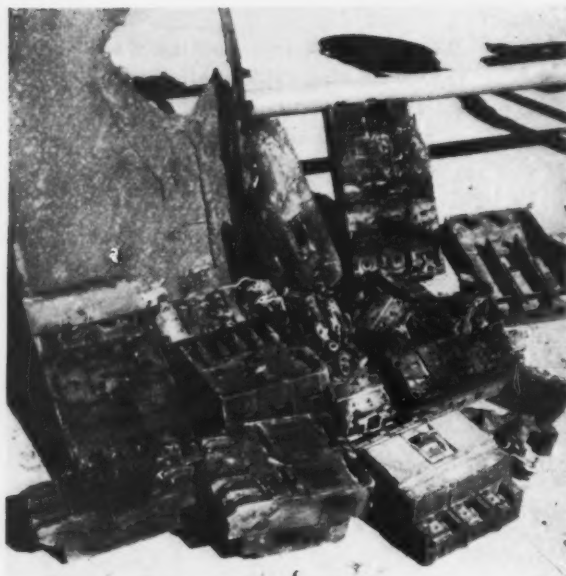
Unsafe act	1	2	3	4	5	Total
Failure to de-energize equipment.....	54	—	16	2	10	82
Assuming an unsafe position...	34	1	8	23	3	69
Use of equipment in an unsafe place.....	12	—	3	7	1	23
Failure to use proper personal protective equipment...	17	1	2	5	2	27
Worker not qualified or competent.....	4	1	5	—	5	15

starter in the circuit and the motor was started or stopped by means of this 200-amp. switch. The result: the switch failed explosively and severely burned the operator who, being right-handed, was standing directly in front

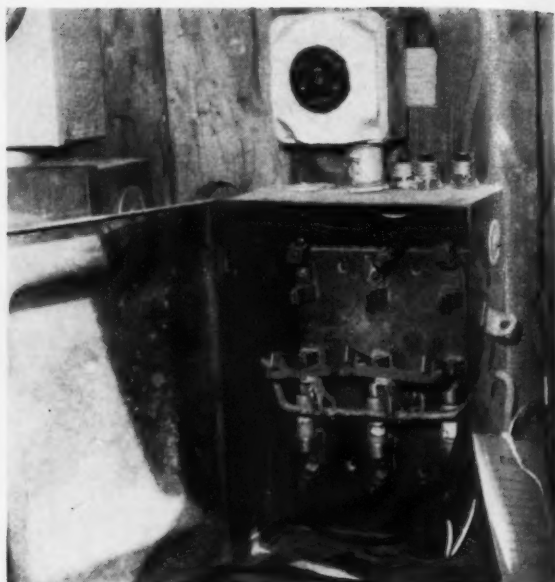
of the switch. It is interesting to note that although the entire upper portion of the switch completely disintegrated and a hole about 3 in. long was burned in the right side of the metal enclosure above the operating handle, the three

fuses were in operating condition.

Thus we see that fuses in a disconnecting switch will not protect its blades and jaws. The switch, if horsepower-rated, must be capable of interrupting installed rotor or fault cur-



A TROUBLE-SHOOTING ELECTRICIAN, when searching for a ground on this 480-v. circuit breaker panelboard, was burned severely when the unit blew up due to faulty maintenance practices.



CAUGHT BEFORE KILLING, this switch could easily fail during operation because the insulating bar connected to the three switch blades was warped, preventing simultaneous contact of the blades.

rents when called on to do so and may not depend on the fuses below it to provide proper protection.

Records in California indicate most switch failures occur on 440-v. circuits and involve 100 or 220-amp. switches. As a result of the severity of 200-amp. switch failures, the California Electrical Safety Orders have required that all motors above 50 hp. and operating at a voltage in excess of 300 v. be supplied from a disconnecting switch of at least 400 amp. rating since 1934.

Practically all switches are required to be enclosed and must be operable from outside the enclosing case. Provision must be provided for locking these switches in the "off" position where such switches are not in sight of equipment. By definition, a distance of 50 ft. is equivalent to being out of sight.

Where a circuit breaker is used in lieu of a switch, the same provisions apply to the breaker. Practically no circuit breaker comes from the manufacturer equipped with means to permit the breaker being locked in the "off" position, unless specifically ordered that way.

Leave room for splices

Many terminal boxes on motors are so small that it is difficult to install the raceway properly in them. Also there is seldom enough room to make up splices properly in these terminal boxes, particularly on small motors.

Auxiliary gutters are often overcrowded; wiring within them literally flies out when the cover is removed.

Splices are often made in overcrowded gutters using overhead line splicing or connecting lugs with sharp edges that cut through the surrounding tape when forced back into the auxiliary gutter.

Another type of hazard—damage to insulation—often is caused by crowding conductors into junction or pull boxes and auxiliary gutters. The wireman may force the conductors into the box by hammering or beating on the conductors, with resulting failure when the circuit is energized.

Crowding contactors and starters for several machines into large cabinets often results in an extreme hazard. Manufacturers have often supplied a single multi-motored machine with all internal wiring made up and installed in the factory, making it convenient for the electrician to install the machine with minimum knowledge of its actual function. Thus, they can better guarantee their machine's performance. Electricians usually only need to install three conductors to three terminals in one corner of the large control cabinet. Wiring from this point on has been factory installed.

To service this multi-motored single machine, the electrician opens one disconnect switch and works safely on any part of the de-energized controls, motor leads, or motor.

Space and dollar saving can be carried too far. Cabinets housing several contactors or starters which supply several different machines are a good example. A recently designed unit of this type, to conserve metal, space and apparently to keep costs down, does not

provide barriers to physically isolate one starter from the others when the door is open for servicing or repair. Usually another panel is located alongside, containing circuit breaker or fused type switches, which provide both short circuit protection and a disconnecting means for the branch circuit supplying a single machine.

In a set up as this, an electrician must work on equipment within the contactor enclosure which is surrounded by other contactors that are energized and still in use even though he has disconnected the equipment on which he is working. Since these contactors are close together—usually less than an inch apart—a slight slip of a tool or his hand could result in an electrical shock or severe burn.

Proper installation stops accidents

"Installation engineering" is a second subject for study when it comes to emphasizing a strong electrical equipment safety program. Many of the injuries incurred in the accidents studied by the Division of Industrial Relations could have been avoided if more thought had been given to safety during the initial installation of the equipment.

Main service installations create a common hazard in the average place of employment. Lack of sufficient clearance of service drops and service conductors over roofs and structures present a safety problem, since these energized conductors are ahead of the main service switch and there is no

means for disconnecting them from their source of supply before any work is done near these conductors. Improper grounding and lack of bonding of service raceways and service equipment are encountered in a large number of instances.

Quite often there is no main disconnecting switch provided. The Electrical Safety Orders require a service switch for each set of service entrance conductors. All service switches must be of a type which will safely interrupt their rated current at rated voltage. There is also the problem of safe interrupting capacity of service equipment to handle the available short circuit capacity of the supply system which may feed fault current into the plant distribution system.

Distribution centers pose problems

The main distribution center, which is often at the same location as the main service switch, presents many problems which usually are also repeated at all other distribution centers. One item that shows a lack of installation engineering and is normally found in practically all plants is inadequate work space around main and subordinate power distribution centers; in many cases, no work space at all. Sufficient space must be provided directly in front of switches and control equipment to permit safe performance of maintenance, operation, adjustment or repairs on equipment. Often material or equipment is piled or installed in this work space. Where railing is provided to insure the space being kept clear, it is often used as a convenient place to stack material and keep it from falling over.

Switches are often mounted too high, preventing them from being readily and safely accessible. To insure switch accessibility the Safety Orders require a maximum mounting height of 6½ ft. above the floor or working platform to the operating handle.

Then there is the problem of identification of switches and control equipment with the motor or other device controlled by that particular switch. Many severe injuries—both electrical and mechanical—have occurred because of lack of switch identification. All switches and control equipment must be plainly marked to identify them with equipment they control.

Overfusing of motor and lighting and appliance circuits is very common. The lack of requiring tamper-resistant type plug fuses exclusively results in practically all lighting circuits being fused at 30 amp. The 30-amp. size results in fewer outages on



FUSES DON'T PROTECT BLADES AND JAWS of switches that fail. This 200-amp. unit was used on a 40-hp., 480-v. motor in a cotton gin. Failing explosively, it badly burned the operator's right hand when hole was blown in casing near switch lever. Note fuses are still intact.

overloaded circuits in panelboards. Jumpered fuses are encountered in many plants where externally operated fused switches are used in motor branch circuits. These may consist of fuse links mounted alongside the cartridge fuse, metal tubing, metal bars, or wire. In such cases, there is no overcurrent device, since these jumpers are merely installed to bridge the gap where a regular fuse is normally installed.

Taps, raceways and conduits

When taps are made from the main feeder conductor in a gutter, the maximum permitted length of an unfused, smaller conductor is often exceeded—often by as much as 10 ft. beyond the permissible distance of 5 ft. This same condition is found where taps are made from a large feeder running along overhead to supply equipment below. The permitted length of 25 ft. with the provisions that such an unfused tap must be at least one-third the size of the larger conductor and must end in a single circuit breaker or single externally operable fused switch is often ignored by the installer.

Metal raceways enclosing the wiring system and other metal enclosures,

such as switches and control equipment, are required to be installed and metallically joined together as a continuous electric conductor. These must be so connected to all boxes, fittings and cabinets as to provide effective electrical continuity. Due to poor workmanship, vibration, and physical movement of these raceways, this continuity is not always present, resulting in a loss of grounding continuity.

Particularly is this true where flexible conduit is used. Screws and fittings may have loosened, due to one cause or another, permitting the conduit to come out of the fitting. Since it is common practice for the installer to cut diagonally across this conduit with a hack saw and finish breaking the flexible conduit across his knee, a sharp edge results. Many instances have occurred where this sharp edge, now out of the fitting, has cut through the insulation due to vibration and cold flow with a resulting hazard to persons touching the ungrounded and energized metal enclosure or raceways as the case may be.

Where motor frames are not otherwise effectively grounded and when the voltage exceeds 150 v. to ground,

... concluded on page 72.

Don't fight torque—put it to work

Here are facts you must know about in-plant torque factors and many other mechanical power transmission fundamentals often misunderstood in the selection and application of sprockets, chains, gears, and other drive equipment.

THE TRANSITION OF FORCE to movement and putting movement

to work—the science of mechanical power transmission—is an extremely fundamental point of plant operation know-how, but there is a gap in Western plants in the working knowledge of this science.

From manpower to horsepower

At one time the transmission of power was a matter of applying force directly to an object. For example, in the early Solomon mines, rocks were pried loose with levers and the ore and precious stones were carried in baskets to washing, sorting, and stor-

age points. While this was going on, the son of David lay watching the work with the unusual comfort of waving palm leaves put into motion by manpower, not horsepower.

Today, the San Manuel Copper Mine in Arizona handles 30,000 tons of ore daily, bringing it from a depth of about 1,400 ft. under the earth's surface. Such an operation is accomplished by mechanical power transmission equipment. A working force of 1,850 people handles not only the mining of the ore, but the concentrating and smelting as well. And anyone falling in the observer-supervisor category watches the work while being cooled by fans rotating on shafts supported by bearings and driven by an electric motor through a quiet V-belt drive.

This would have taken the Solomon mine workers—if the ore only contained 1% copper content—a travel feat of about 6,000,000 man miles per day and an operational force of approximately 37,000 men per shift. The difference lies in the use of power and force that perform work through systems of wheels, shafts, and bearings. However, much of the impact of such a work feat is taken for granted today—often to the point of by-passing the fact that it takes a sound understanding of mechanical power transmission fundamentals to select the proper equipment to do a given job and to effectively install the equipment to take advantage of its best performance.

Where to find know-how data

The accepted sources of information concerning bearings, shafts, and other mechanical power transmission items are catalogs offered by manufacturers of the equipment. Engineering groups, qualified through training and experience to explore the need for service factors and the relationship of products involved in product design, are continually at work perfecting industry standards. However, the end success of a gear speed reducer, for ex-

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Mr. Carroll developed this article somewhat in reply to a challenge presented both by WI editors and by many plant operators he has worked with in the West. Several months ago, when contacted by WI as a recognized expert in the mechanical power transmission field, he stated that a large gap existed among Western plant operators in their concept of mechanical power transmission application fundamentals (challenge number one). We suggested he make a contribution toward filling the gap on a wholesale basis (challenge number two) and thereby save some of the many plant operating dollars lost daily through misunderstanding such basic items as torque. This article, highlighting practical facts learned through 35 years of experience in the mechanical power transmission field (12 of them in the West), constitutes but a part of the solution, but there is more to come in future issues.

ample, depends upon how realistically the expected performance and operating conditions to be imposed upon the equipment are recognized.

While engineers are constantly at work developing new types of bearings, clutches, etc., the fact remains that there are four basic tools in the mechanical power transmission realm of equipment: the flywheel, the lever, the wedge, and the inclined plane.

How to compute power

The application of these simple devices involves consideration of many functions, such as *work*. Although everyone is certain he knows what work is, few are able to define the term satisfactorily. In its simplest mechanical form, work is defined as force times distance, with the added stipulation that the force is measured in the same direction as the distance.

Next in line for consideration is *power*, which is defined as the rate of doing work or the rate at which work is being done. Thus, power is work divided by time. Understanding that determination of power involves the element of time, power can next be thought of in terms of horsepower.

It was established long ago that the average horse was capable of pulling in one direction at the rate of 550 lb. per sec. Thus, as a medium of "talking" about power and as a comparison means, this was established as the basis of power computation. The method of expressing horsepower capacity of any prime mover is the same. For example, to lift 200 lb. to a height of 55 ft. in 10 sec. time we have force, distance, and time as known elements and can compute horsepower as follows:

$$\text{power} = \frac{200 \text{ lb.} \times 55 \text{ ft.}}{10 \text{ sec.}} = 1100 \text{ ft. lb./sec.}$$

to obtain horsepower, we use the established constant:

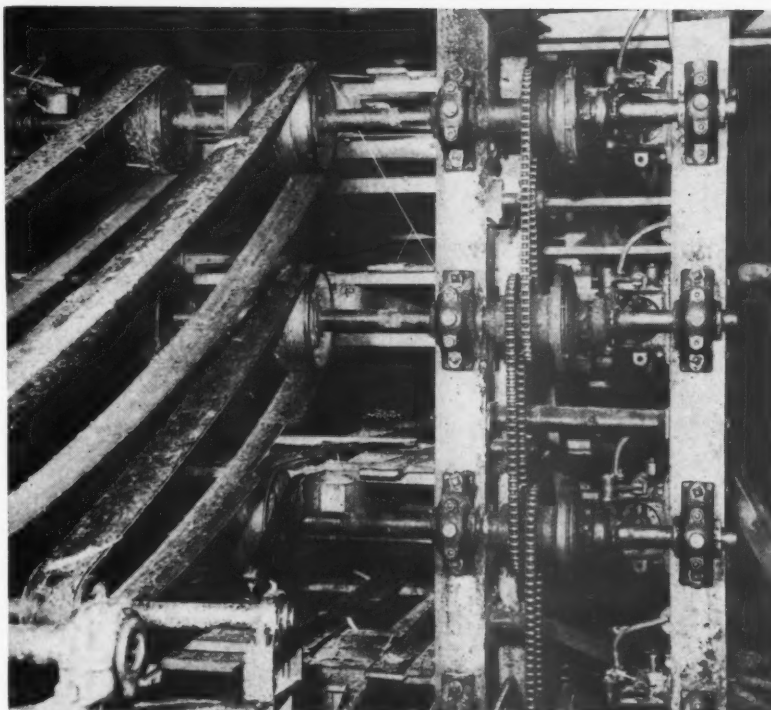
$$\frac{1100}{550} = 2 \text{ hp.}$$

To simplify such calculations, mechanical power transmission problems are solved in terms of foot pounds per minute and revolutions per minute. Therefore, such resolutions are obtained using 33,000, or 550 x 60 sec., as the constant.

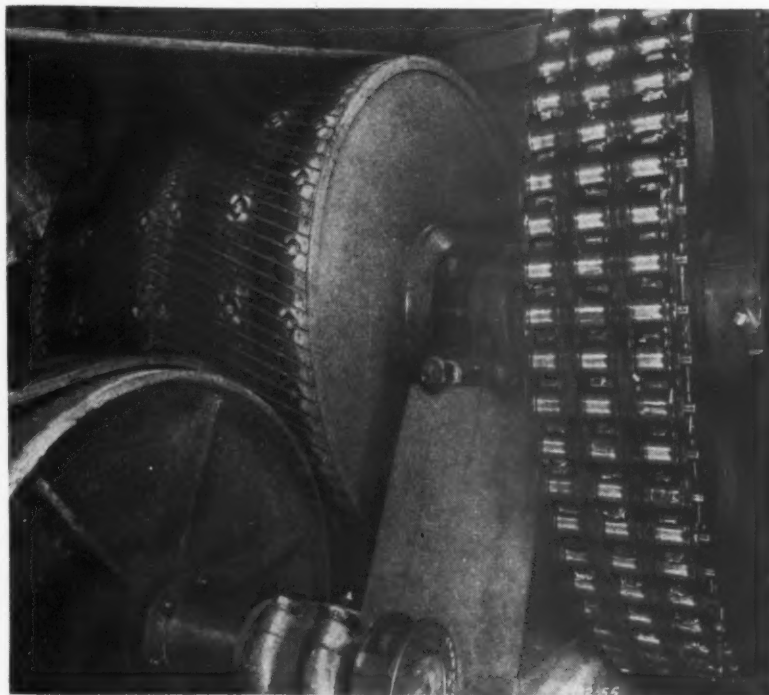
A matter of mechanical advantage

Basically speaking, the principal intent in the use of mechanical power transmission devices is to ease the manpower required to do a given job by developing a mechanical advantage through a combination of levers.

A simple form of obtaining such mechanical advantage is the use of



DUST, PITCH AND MOISTURE gang up on this main drive for veneer trays at Springfield Plywood Co. Equipment here was selected for durability.



HIGH TENSION, LOW SPEED AND HIGH TORQUE were compounded by underground service conditions on this conveyor drive at Pend Orielle mines in Wash. It took a sound understanding of torque to pick the right equipment to meet operating problems in this bulk hauling task.

block and tackle or chain hoist equipment enabling a man weighing no more than 150 lb. to lift or pull a ton of weight.

A pulley, sheave, gear, or sprocket is a form of lever; in fact, all mechanical power transmission devices through which speed changes or direc-

Shaft selection guide —

see text on this page
for how-to-use-it data

therefore,

$$\text{Torque (in in. lb.)} = \frac{\text{Horsepower} \times 63,000}{\text{rpm.}}$$

Table A—No Bending Moment. (Shafts without pulleys, sprockets or gears. Torsion only.)

Shaft Size	Horse Power at Various Revolutions per Minute																			
	25	50	75	100	125	150	175	200	225	250	275	300	350	400	500	600	700	800	900	
1/4"	3	7	1.1	1.5	1.9	2.3	2.8	3.0	3.4	3.8	4.2	4.6	5.3	6.1	7.7	9.2	10.7	12.3	13.8	
1/2"	7	15	2.3	3.1	3.9	4.6	5.4	6.3	7.0	7.8	8.6	9.3	10.9	12.5	15.6	18.7	21.9	25.0	28.1	
3/4"	13	27	4.1	5.5	6.9	8.3	9.7	11.1	12.4	13.8	15.2	16.6	19.4	22.2	27.7	33.3	38.8	44.4	49.9	
1"	22	44	6.6	8.9	11.2	13.4	15.7	17.9	20.2	22.4	24.7	26.9	31.4	35.9	44.9	53.9	62.8	71.8	80.8	
1 1/4"	33	67	10.1	13.5	16.9	20.3	23.7	27.1	30.5	33.9	37.3	40.7	47.5	54.3	67.9	81.5	95.1	108.7	122.3	
1 1/2"	49	98	14.6	19.5	24.4	29.3	34.2	39.1	44.0	48.9	53.8	58.6	68.4	78.2	97.6	117.0	136.4	155.8	175.2	
2"	67	135	20.2	27.0	33.8	40.6	47.3	54.1	60.9	67.6	74.4	81.2	94.7	108.1	135.1	162.1	189.1	216.1	243.1	
2 1/2"	90	181	27.1	36.2	45.3	54.4	63.4	72.5	81.6	90.7	99.7	108.8	126.1	145.2	181.5	217.8	254.1	290.4	326.7	
3"	118	236	35.4	47.3	59.2	71.1	82.9	94.7	106.1	118.0	130.2	142.6	165.9	189.3	236.6	284.0	331.4	378.8	426.2	
3 1/2"	190	379	57.0	75.9	94.9	113.8	132.7	151.6	170.5	189.4	208.3	227.2	265.3	303.4	379.5	455.6	531.7	607.8	683.9	
4"	285	570	85.5	114.0	142.0	171.0	199.5	228.0	256.5	285.0	313.5	342.0	399.6	457.2	571.5	685.8	799.1	913.4	1027.7	
4 1/2"	408	816	122.0	162.0	202.0	242.0	282.0	322.0	362.0	402.0	442.0	482.0	559.2	636.4	795.5	954.6	1113.7	1272.8	1431.9	

Table B—Limited Bending Moment. (Pulleys, sprockets or gears near bearings. Ordinary line shafts.)

Shaft Size	Horse Power at Various Revolutions per Minute																			
	25	50	75	100	125	150	175	200	225	250	275	300	350	400	500	600	700	800	900	
1 1/4"	2	5	7	10	12	15	17	20	23	25	28	30	35	41	51	61	71	82	92	
1 1/2"	5	10	15	20	26	31	36	41	47	52	57	62	73	83	104	125	146	167	188	
1 3/4"	9	18	27	37	46	55	64	74	83	93	101	111	129	148	185	222	259	296	333	
2"	14	29	43	59	74	89	104	119	134	149	164	179	203	239	299	359	419	479	539	
2 1/4"	22	45	67	90	113	136	159	182	205	228	251	274	317	360	453	546	639	732	825	
2 1/2"	32	65	97	130	163	196	229	262	295	328	361	394	458	522	655	788	921	1054	1187	
2 3/4"	45	90	135	180	225	270	315	360	405	450	495	540	630	720	900	1080	1260	1440	1620	
3"	60	121	181	242	302	363	424	484	545	605	666	727	847	967	1211	1455	1699	1943	2187	
3 1/4"	79	158	237	316	395	474	553	632	711	790	869	948	1101	1261	1581	1891	2201	2511	2821	
3 1/2"	126	253	379	506	633	760	886	1011	1137	1268	1399	1531	1772	2023	2533	3044	3555	4066	4577	
3 3/4"	190	380	570	760	949	1138	1327	1517	1710	1899	2088	2276	2653	3034	3795	4556	5317	6078	6839	
4"	275	550	825	1099	1374	1649	1924	2199	2474	2749	3024	3300	3876	4452	5565	6678	7791	8904	10017	
4 1/4"	375	750	1125	1500	1875	2250	2625	2999	3375	3750	4125	4500	5250	6000	7500	9000	10500	12000	13500	
5"	50	100	150	200	250	300	350	400	450	500	550	600	700	800	1000	1200	1400	1600	1800	
5 1/4"	65	130	195	260	325	390	455	520	585	650	715	780	910	1040	1300	1560	1820	2080	2340	
5 1/2"	85	170	255	340	425	510	595	680	765	850	935	1020	1190	1360	1700	2040	2380	2720	3060	

Table C—Heavy Bending Moment. (Use for main or important shafts.)

Shaft Size	Horse Power at Various Revolutions per Minute																			
	25	50	75	100	125	150	175	200	225	250	275	300	350	400	500	600	700	800	900	
1 1/16"	8	17	2.5	3.5	4.4	5.3	6.2	7.1	8.0	8.9	9.8	10.7	12.5	14.3	17.9	21.5	25.1	28.7	32.3	
1 1/8"	10	20	3.0	4.3	5.4	6.5	7.6	8.7	9.8	10.9	12.0	13.1	15.1	17.2	21.5	26.2	31.0	35.8	40.5	
1 1/4"	13	27	3.9	5.8	7.8	9.7	11.7	13.7	15.6	17.6	19.5	21.5	23.4	27.4	31.3	39.1	46.9	54.8	62.6	
1 1/2"	19	39	5.4	8.1	10.8	13.5	16.2	18.9	21.6	24.3	27.0	29.7	32.4	37.9	43.4	54.1	64.8	75.6	86.6	
1 3/8"	21	42	5.6	8.4	11.2	14.0	16.8	19.6	22.4	25.2	28.0	30.8	35.6	40.4	50.5	61.6	72.7	83.8	94.9	
1 3/4"	26	52	6.8	10.2	13.6	17.0	20.4	23.8	27.2	30.6	34.0	37.4	43.7	50.0	62.5	75.0	87.5	100.0	112.5	
2"	35	71	9.1	13.7	18.3	22.9	27.5	32.1	36.7	41.3	45.9	50.5	58.9	67.3	84.1	100.9	117.7	134.5	151.3	
2 1/8"	41	82	10.5	15.8	21.0	26.3	31.6	36.9	42.2	47.5	52.8	58.1	67.5	76.9	97.4	116.9	136.4	155.9	175.4	
2 1/4"	46	92	11.6	17.4	23.2	29.0	34.8	40.6	46.4	52.2	58.0	63.8	74.2	84.6	107.5	128.4	149.3	170.2	191.1	
2 1/2"	53	106	13.2	20.0	26.7	33.4	40.1	46.8	53.5	60.2	66.9	73.6	86.3	99.0	125.1	151.2	177.3	203.4	229.5	
3"	74	148	22.8	34.2	45.6	57.0	68.4	79.8	91.2	102.6	114.0	125.4	136.8	159.1	182.7	228.2	273.7	319.2	364.7	
3 1/8"	81	162	23.6	35.4	46.9	58.3	69.7	81.1	92.5	103.9	115.3	126.7	149.0	171.3	210.4	255.5	300.6	345.7	390.8	
3 1/4"	87	174	25.1	37.7	50.3	62.9	75.5	88.1	100.7	113.3	125.9	138.5	160.8	183.1	226.4	273.7	320.9	368.2	415.5	
3 1/2"	95	190	26.0	39.0	52.0	65.0	78.0	91.0	104.0	117.0	130.0	143.0	165.0	187.0	234.0	285.0	336.0	387.0	438.0	
4"	120	240	30.0	45.0	60.0	75.0	90.0	105.0	120.0	135.0	150.0	165.0	192.0	219.0	273.0	331.0	389.0	447.0	505.0	
4 1/8"	135	270	33.0	49.5	66.0	82.5	99.0	115.5	132.0	148.5	165.0	181.5	212.0	243.0	301.0	364.0	427.0	490.0	553.0	
4 1/4"	150	300	36.0	54.0	72.0	90.0	108.0	126.0	144.0	162.0	180.0	200.0	234.0	268.0	335.0	408.0	481.0	554.0	627.0	
4 1/2"	165	330	39.0	58.5	78.0	97.5	117.0	136.5	156.0	175.5	195.0	214.5	252.0	290.0	363.0	441.0	519.0	597.0	675.0	
5"	210	420	50.0	75.0	100.0	125.0	150.0	175.0	200.0	225.0	250.0	275.0	330.0	390.0	495.0	594.0	693.0	792.0	891.0	
5 1/8"	235	470	55.0	82.5	110.0	137.5	165.0	192.5	220.0	247.5	275.0	302.5	363.0	432.0	558.0	673.0	788.0	903.0	1018.0	
5 1/4"	255	510	59.0	88.5	118.0	147.0	176.0	205.0	234.0	263.0	292.0	321.0	387.0	462.0	597.0	726.0	855.0	984.0	1113.0	
5 1/2"	280	560	64.0	96.0	128.0	160.0	192.0	224.0	256.0	288.0	320.0	352.0	424.0	504.0	648.0	792.0	936.0	1080.0	1224.0	
6"	360	720	84.0	126.0	168.0	210.0	252.0	294.0	336.0	378.0	420.0	462.0	552.0	662.0	848.0	1017.0	1186.0	1355.0	1524.0	
6 1/8"	405	810	92.0	138.0	184.0	230.0	276.0	322.0	368.0	414.0	460.0	506.0	604.0	724.0	928.0	1113.0	1298.0	1483.0	1668.0	
6 1/4"	440	880	100.0	150.0	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	656.0	787.0	1016.0	1223.0	1430.0	1637.0	1844.0	
6 1/2"	480	960	108.0	162.0	216.0	270.0	324.0	378.0	432.0	486.0	540.0	594.0	708.0	849.0	1098.0	1323.0	1548.0	1773.0	2000.0	
7"	600	1200	132.0	198.0	264.0	330.0	396.0	462.0	528.0	594.0	660.0	726.0	872.0	1044.0	1336.0	1628.0	1920.0	2212.0	2504.0	
7 1/8"	675	1350	145.0	217.5	289.0	361.5	433.5	505.5	577.5	649.5	721.5	793.5	948.0	1137.0	1454.0	1771.0	2088.0	2405.0	2722.0	
7 1/4"	750	1500	156.0	234.0	312.0	390.0	468.0	546.0	624.0	702.0	780.0	858.0	1024.0	1236.0	1584.0	1920.0	2256.0	2592.0	2928.0	
7 1/2"	840	1680	174.0	261.0	348.0	435.0	522.0	609.0	696.0	783.0	870.0	957.0	1136.0	1375.0	1768.0	2161.0	2554.0	2947.0	3340.0	
8"	114	228	343	458	574	689	804	918	1033	1148	1263	1377	1607	1837	2296	2755	3214	3674	4133	
9"	136	272	408	545	681	817	954	1090	1226	1363	1499	1635	1908	2181	2726	3271	3816	4361	4907	
10"	160	320	480	640	800	960	1120	1280	1440	1600	1760	1920	2244	2568	3216	3864	4512	5160	5808	
11"	186	373	559	747	934	1121	1308	1495	1682	1869	2056	2243	2617	2991	3739	4487	5235	5983	6731	

Table D—Severe Conditions. (Heavy shock loads. Excessively tight belts. Long clutch sleeves.)

Shaft Size	Horse Power at Various Revolutions per Minute																			
	25	50	75	100	125	150	175	200	225	250	275	300	350	400	500	600	700	800	900	
1 1/4"	4	8	1.2	1.7	2.2	2.8	3.1	3.5	4.0	4.4	4.9	5.3	6.2	7.1	8.9	10.7	12.5	14.3	16.1	
1 1/2"	6	13	2.0	2.7	3.3	4.0	4.7	5.4	6.1	6.7	7.4	8.1	9.5	10.8	13.5	16.3	19.0	21.7	24.4	
2"	9	19	2.9	3.9	4.8	5.8	6.8	7.8	8.8	9.7	10.7	11.7	13.7	15.6	19.5	23.4	27.3	31.2	35.1	
2 1/2"	13	27	4.0	5.4	6.7	8.1	9.4	10.8	12.3	13.7	15.1	16.5	19.3	22.1	27.7	33.3	38.9	44.5	49.9	
2 3/4"	18	36	5.6	7.2	9.0	10.8	12.7	14.5	16.3	18.1	19.9	21.7	25.4	29.0	36.2	43.5	50.8	58.0	65.3	
3"	23	47	7.0	9.4	11.8	14.2	16.6	19.0	21.4	23.8	26.2	28.6	33.1	37.6	47.3	56.6	65.9	75.2	84.5	
3 1/2"	37	75	11.0	14.5	18.0	21.5	25.0	28.5	32.0	35.5	39.0	42.5	50.0	57.5	71.2	84.9	98.6	112.3	126.0	
4"	57	114	17.1	22.8	28.5	34.2	39.9	45.6	51.3	57.0	62.7	68.4	81.2	94.0	117.0	140.0	163.0	186.0	209.0	
4 1/2"	81	163	24.4	32.6	40.8	49.0	57.2	65.4	73.6	81.8	89.9	98.1	114.1	130.1	163.1	196.1	229.1	262.1	295.1	
5"	112	225	33.7	45.0	56.3	67.6	78.9	90.2	101.5	112.8	124.1	135.4	162.5	189.6	236.8	283.9	331.1	378.2	425.3	
5 1/2"	150	300	45.0	60.0	75.0	90.0	105.0	120.0	135.0	150.0	165.0	180.0	210.0	240.0	300.0	360.0	420.0	480.0	540.0	
6"	195	390	58.3	78.0	97.5	117.0	137.3	157.5	177.8	198.1	218.3	238.6	286.3	334.0	417.5	499.0	580.5	662.0	743.5	
6 1/2"	250	500	76.5	102.5	128.0	154.0	179.0	205.0	231.0	256.0	282.0	308.0	359.0	410.0	513.0	616.0	719.0	822.0	925.0	
7"	323	646	100.0	133.0	166.0	199.0	232.0	265.0	298.0	331.0	364.0	397.0	468.0	539.0	673.0	807.0	941.0	1075.0	1209.0	
7 1/2"	416	832	131.0	175.0	219.0	263.0	307.0	351.0	395.0	439.0	483.0	527.0	628.0	729.0	901.0	1073.0	1245.0	1417.0	1589.0	
8"	570	1140	171.0	229.0	287.0	344.0	401.0	459.0	516.0	574.0	631.0	688.0	813.0	938.0	1148.0	1377.0	1607.0	1837.0	2067.0	
9"	680	1360	204.0	272.0	340.0	408.0	476.0	545.0	613.0	681.0	749.0	817.0	975.0	1133.0	1380.0	1644.0	1908.0	2172.0	2436.0	
10"	830	1660	250.0	333.0	417.0	500.0	583.0	666.0	749.0	832.0	915.0	998.0	1191.0	1384.0	1680.0	1992.0	2244.0	2496.0	2748.0	
11"	980	1960	279.0	373.0	467.0	560.0	654.0	747.0	841.0	934.0	1028.0	1121.0	1336.0	1549.0	1869.0	2241.0	2617.0	2991.0	3365.0	

Steam turbine.....	Low
Electric motors	
a. Induction.....	High (200-300% of rated cap.)
b. Direct current.....	Extremely high
Gasoline engines	
a. 2 cycle.....	Low
b. 4 cycle.....	Low
Diesel engines	
a. Low speed.....	Moderate
b. High speed.....	Low
Hydraulic motors.....	Extremely high
Air motors (displacement type).....	High

Utilization of the useful power of the various prime movers is measured in terms of horsepower. The starting characteristics of the movers differ and may not conform with the needs of the driven machine. For example, a synchronous motor may deliver 260% of its rated capacity, or a 10-hp. motor momentarily delivers 26 hp. If connected to one of these low inertia drives, it is conceivable that arms in a fan could be torn off before fully responding to such an instantaneous surge of force. On the other hand, one of these drives powering the flywheel on a press puts this surge to work, utilizing the advantage of time and distance of travel to store several hundred horsepower in the flywheel in order to perform the work of bending or punching a plate at intervals. So cycled, punch operations allow the flywheel to be restored with this energy.

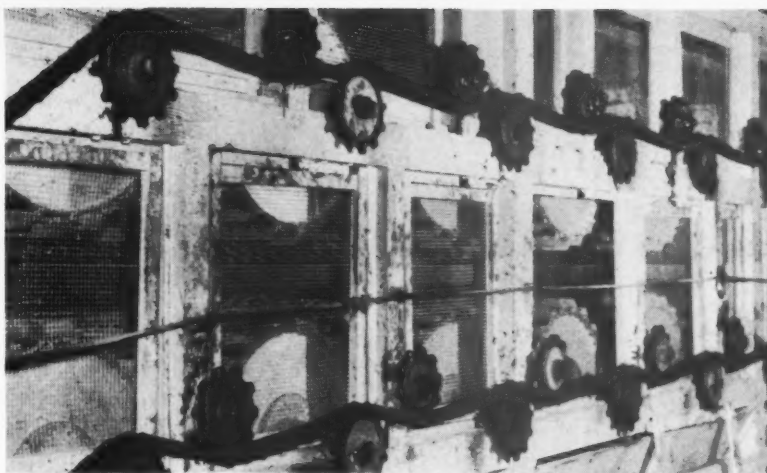
V-belts don't mean no-load cushion

On flywheels or high inertia types of drives the motor is often coupled to the driven wheel through V-belts that provide a small amount of cushioning effect, but not enough to allow the motor to come up to full speed in a manner that follows a no-load pattern.

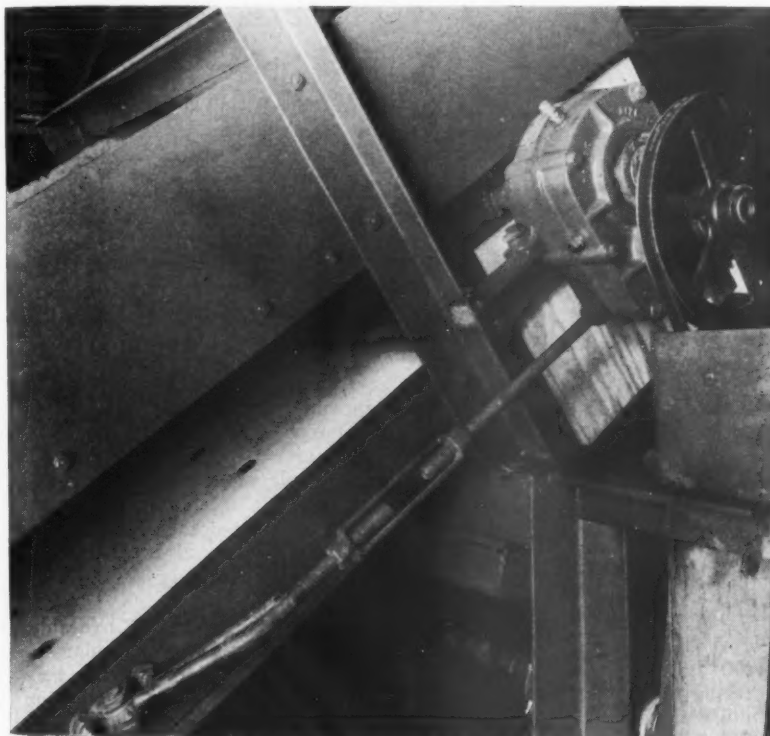
Every mechanical power transmission device mounted on a motor shaft or connecting drive shaft is subject to torque and must be capable of having ample capacity to receive the highest torque the motor is capable of imposing. The maximum torque on low voltage and slip ring types, as well as some others, may be delivered at only 60 to 70% of the full speed.

How to select couplings

Shaft projections on standard electric motors are of ample length to enable assembling of couplings. Before selecting a coupling, it should be determined whether the motor is provided with a floating or fixed rotor assembly. A fixed rotor assembly rotates but is held in a single field position. Many large motors are designed to let



20-DRUM DRIVE at W. J. Wisemann Hop Ranch near Sacramento, Calif., is powered by a 30-hp. motor through a clutch. V-belt to first drum pulley transmits power to continuous chain driving 19 other hop pickers.



VARIABLE SPEED CONTROL is built into this inclined conveyor drive at Valley Evaporating Co., Cowiche, Wash. Sheave ratios are adjusted by changing torque arm setting to provide drive speed required.

the rotor "float" with respect to its field location with considerable end-wise movement.

In the case of the "floating rotor" motors, a coupling should be selected that will easily accommodate such end float. Flexible couplings, because of the common meaning of flexible, are often misunderstood—as are anti-friction bearings, another misleading nomenclature. A flexible coupling is

less rigid than two halves of a bolted flange coupling, but it is *not intended to be used as a universal joint*.

Most couplings now commercially available will compensate for some angular misalignment, but not a combination of parallel and angular misalignment. Parallel misalignment is damaging because eccentric loading increases bearing loads on the driving and driven ends of the system.

How hydraulic power can save plant dollars

Examples of how the advantages of hydraulic power units are being utilized in Western plants as more flexible and less space consuming power packs on new equipment and to revamp the old equipment.

PROVIDING ENOUGH manufacturing space to meet constantly mounting production demands is the West's constant problem these days. Despite the many new plant building and expansion announcements that pepper every month's industrial news in the West, the typical Western plant is overcrowded, with too much equipment in too little space. Thousands of smaller plants cannot yet economically expand their floor space, while many of the newest and biggest plants—built yesterday with tomorrow's expansion and space needs planned—are already crammed and cramped. These are big reasons why Western plant operating men should sharpen up their knowledge of hydraulic and

air power application.

Today's hydraulic equipment combines more torque and horsepower per cubic inch of physical space than any other form of power. A fluid motor for example, rated at 100 hp. at 1,200 rpm. will fit in a space less than 1 x 1 x 2 ft. A hydraulic cylinder with a system pressure of 2,000 psi. will produce approximately 40,000 lb. of force in a 5-in. diameter.

Another advantage of hydraulic power transmission of particular importance to plants in the West, where versatility in equipment application rides hand in hand with plant operat-

ing ingenuity, is the wide number of locations and systems in which hydraulic power equipment can be installed. The electric-driven hydraulic pumping unit can be installed under almost any circumstances.

Working component flexible too

This is also true, fortunately, of the working component in a hydraulic drive—the hydraulic motor or cylinder—and positioning either of these components is generally of no consequence to their effective operation. All valving necessary to actuate a complete hydraulic system can be placed with the power unit in a self-contained, compact package or control panel providing a completely automatic system. Connection of the cylinder or fluid motor to the control unit only requires the installation of a pressure line and a return line. Available in pipe, tube, or flexible hose form, these lines can be run at ceiling level, floor level, under benches, or around corners.

With a rapid increase in the number of completely automatic operations in the West, two more advantages of fluid power systems become vitally important. The first of these is the infinitely variable speed control provided through flow control. Secondly, hydraulic power units are capable of producing infinitely variable pressures, ranging from a very low psi. to the maximum pressure for which the unit was designed. Changes in either of these variable control features are accomplished quickly and simply by the turn of one or two knobs on a central control panel.

Here are three good examples of how these advantages of hydraulic power have been applied in Western plants.

Control for machine tools

Machine tools in Western plants rely heavily upon hydraulic power for the performance of many actions.

One special boring mill used for thread cutting is saving money and doing a better job for a large Western plant. Capable of cutting threads up to 12-in. diameter with a thread depth of 1 1/4 in., this machine is driven by two hydraulic motors from power furnished by a central hydraulic power unit. One of the hydraulic motors, driving a speed reducer, handles the stock feed and, through use of a flow control valve, provides infinitely variable speed. The other fluid motor drives the cutting blade through a gear train connection and is used also for rotation of the cutting head assembly.

It is impossible to damage this drive system by shocks which could result

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from tooling imperfections. Another important feature of the drive is the fact that the cutting head assembly may be rotated 180 deg. without removing the hydraulic motor drive from the unit.

The entire operation is accomplished by bolting the hydraulic motor directly to the cutting head assembly, eliminating all mechanical linkage. A pressure and return line to the two hydraulic motors is all that is required.

Heavy drive mechanism eliminated

Another special milling machine in the same plant was designed to cut special grooves on an important machine part. In order to machine this particular type of groove, the cutter head must move in an arc as the tool rotates. A need for the machining of several sizes adds a problem in lateral movement of the cutting head from dead center to positions several feet from dead center.

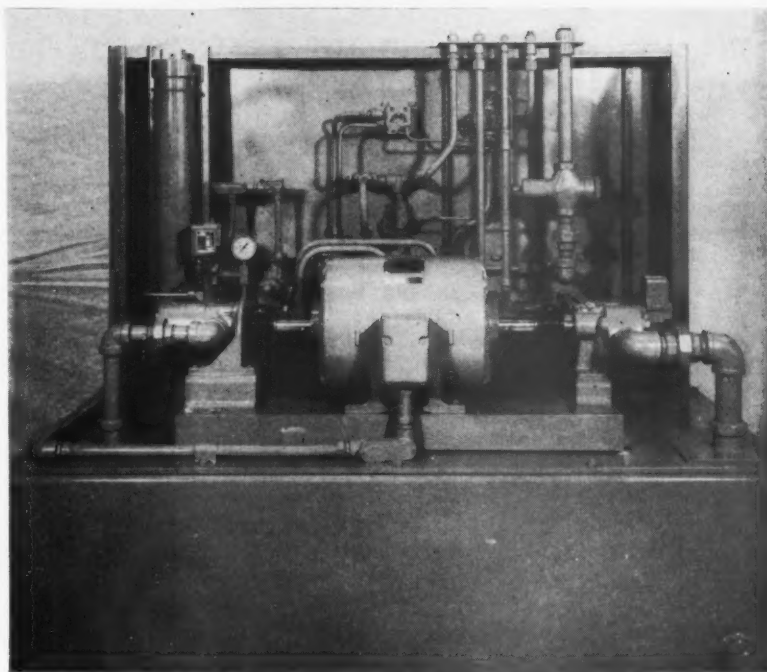
To do precision work under these conditions, the machine was previously driven by electric motor located behind the machine with the power being transmitted through a belt, an installation requiring large bearings on the head itself. Heavy and costly drive mechanisms were eliminated through the installation of a hydraulic drive unit enabling location of the cutter head at any desired distance from dead center. Once positioned, the head is simply bolted into place for the job. One small hydraulic motor drives the cutting blade, while another, located at the base of the machine, drives the feed mechanism. Once again, infinitely variable speed and pressure controls were the key to more effective and less costly operation.

Plastic presses modernized

No other single application is more readily adaptable to hydraulic power than the industrial press. With the technological developments of high pressure hydraulic components, it is now possible to install a press which is capable of delivering large quantities of force in a very small and compact package.

Let's take a look at the general modernization program now being conducted at American Molding Co., San Francisco plastic molding plant, to get an idea as to how hydraulic power is put to work to up-date plant operations. Here, injection molding machines, transfer and compression presses, and extrusion machines are used.

The transfer and compression



UP-DATING PLASTIC PRESS POWER, this hydraulic power unit replaced a water hydraulic system on the first of many plastic transfer and compression presses at American Molding in San Francisco. Other presses will be powered by the same system upon installation at a new plant.

presses were, until recently, operated entirely by water hydraulics. Banks of the units were powered from large, weighted water accumulators that were filled by heavy-duty water pumps. Operating the presses was accomplished through manipulation of hand valves and the system required running water pipes throughout the plant to connect the various presses to the accumulator.

The basic circuit for such a system is very simple, but it poses several disadvantages. Circuitry consists of pumping up water to the accumulator which is heavily weighted. Opening a manually operated machine valve permits the accumulator to push water under pressure through the pipes and lower the ram on the press.

A large accumulator of the type used at American Molding creates tremendous shock pressures in the entire system whenever it drops and is brought to a sudden halt by shutting the valve. Leaks constantly occur in the pressure and return lines due to the tremendous pressure changes. Long life is virtually impossible to maintain on the cylinder ram packings due to corrosive and rusting effect of water on metal. Another disadvantage of particular importance to modern industry is the impossibility of introducing any factor of automatic operation into water hydraulic systems. This is true due to the scale which

forms in the pipes and valves. And, if the central hydraulic pump that feeds the accumulator fails, it means that the entire press operation is down and no piece parts could be manufactured — multiplying modern-day plants' worst plague, downtime on important production equipment, many times over.

Now, push-button operation

The current changeover to high pressure oil hydraulic systems at American Molding has resulted in completely automatic operation. Press operators simply press a button and the press takes over the approach, press, cure, and return cycle automatically and pretimed to the exact second needed to successfully compress and heat the end plastic product.

Shock has been eliminated as has piping throughout the press room. Each central power unit controls one, two, three, or four presses or each press can be operated individually as desired. Each acts as an individual system and failure of any one component does not affect other presses operating.

The up-dating program involving such extensive installation of hydraulic power systems will reach its climax for American Molding when the 20-year-old firm moves into its new plant soon.

Electrical load problems in growing plants

How can you provide adequate electrical capacity for your plant today to avoid wasted effort and cost tomorrow? Here are best solutions for both large and small plants, with pro's and con's for each.

HOW CAN rapidly expanding industrial plants be sure that increased electrical capacity requirements are met efficiently and economically? How should electrical service and distribution equipment be chosen to avoid wasted effort and cost, and at the same time provide practically unlimited capacity in this important link of any plant's power system?

Four primary solutions

These are important questions that the West's food processing plants have had to answer during the past few years. A charting of comparative load growth in typical plants shows why —pauses and drops in electrical load

growth occurred, but the overall trend is strongly upward. Best suggested solutions to these problems in food processing plants, discussed below, in almost all cases are applicable also to expanding plants making a variety of manufactured items.

In order to provide adequate electrical capacity, the engineer and owner can choose from four primary solutions, as follows:

Single low-voltage service

The single service entrance taking delivery at 240 or 480-v. with secondary or low-voltage metering, is the

simplest and least expensive for a small plant.

If the utility provides either of these three-phase services from its own transformers, located off of the customer's property, through a single service drop, it is probable that the maximum available capacity will be 500 or 750 hp. at 240-v. or double this amount at 480-v.

Should the customer's load exceed the horsepower mentioned above, it will probably be necessary for him to provide space for a ground-level substation or a vault inside the plant. The service switch will then limit the available horsepower to 1,000 or 2,000 depending on the service voltage. There is a definite upper limit upon the electrical size of the plant with this system.

Single high-voltage service

With a single high-voltage service, single substation, primary or secondary metering, 240 or 480-v. utilization voltage, the owner has more freedom of choice and greater electrical capacity.

Ownership of the high-voltage switch and transformers in the case of primary metering shifts the cost of initial investment and responsibility for maintenance from the utility to the customer. The cost of energy as billed by the utility will be lower, and the available horsepower will depend upon the transformer size and the low-voltage switchgear. However, the low-voltage equipment will have the same limitations as in the previous case unless adequate provisions for future load are made at the outset.

Multiple high-voltage services

Multiple high-voltage services to several non-interconnected substations located remotely but serving the same installation increase capacity in proportion to their number.

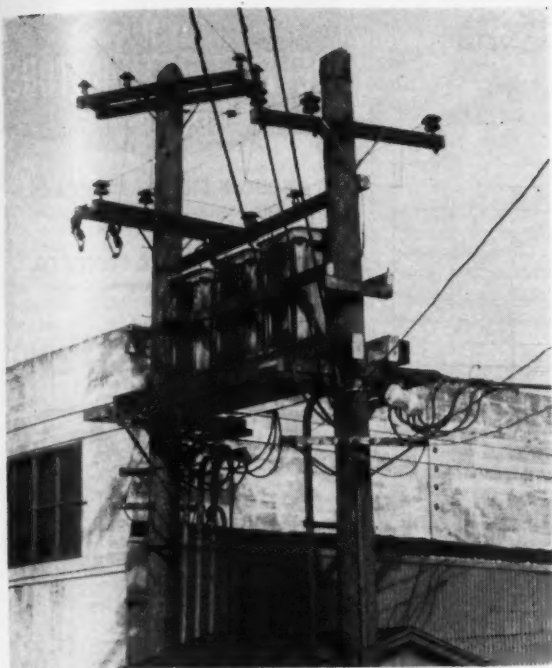
When a plant has grown too large electrically for the capacity of its original substation and service equipment, introduction of a second service, substation and distribution equipment

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Bob Wilson can speak with considerable practical authority on this subject of special interest to the West. During the past 11 years, he has visited Cal-Pak's growing plants throughout the U. S. to observe their electrical problems and recommend best solutions. His remarks here are adapted from a talk he made this year before the AIEE meet in San Francisco.



LEAST EXPENSIVE, but unsightly and difficult to expand, are pole-mounted utility-owned substations. Subsequent increase of load has required removal of this set-up and substitution of a large ground level substation.



OIL-FILLED TRANSFORMERS, owned by utility, require a vault when installed inside plant. When loads go beyond capacity of vault, another substation must be built, requiring second service or abandonment of vault.

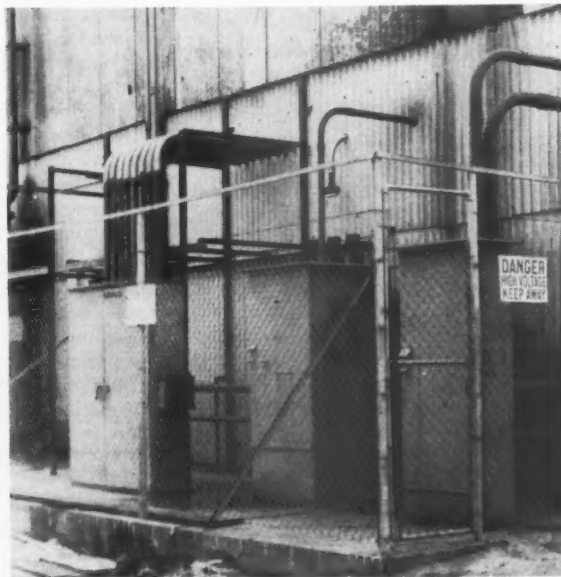


SECOND SERVICE AND SUBSTATION for this growing plant became a necessity. Although room is available to expand, provision of two services increases the cost of energy (see text and chart for the reasons why).

will provide something of a solution. Regardless of ownership of switch-gear and transformers, the low-voltage bus and distribution facilities will in time become completely loaded and expansion stops again.

Usually, each primary service will have its own meter and separate bill.

Unless a rate is available which combines or totalizes the demand and kilowatt-hour consumption of the two services, each bill is computed independently, resulting in a total cost for energy greater than if it were all measured and billed through just a single meter.



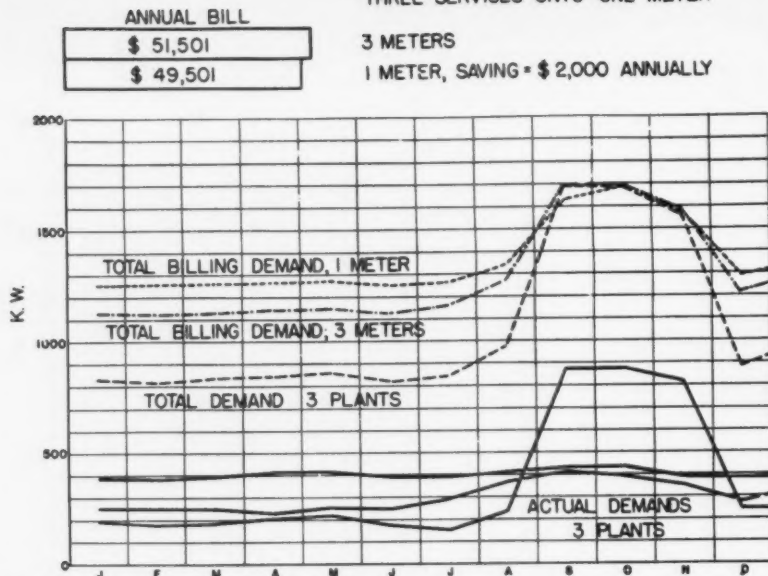
HIGH-VOLTAGE DISTRIBUTION SYSTEM permits almost unlimited additional substations in this plant as they are needed. Enclosure pictured can have three. One is shown in place, while work on second is proceeding

More services push costs up

The cost of combining several services may be so great that the savings available cannot pay off the investment in a reasonable time. Furthermore, it may not be possible to continue to add more primary services

All photos by author

EFFECT OF COMBINING THREE SERVICES ONTO ONE METER



ONE METER FOR SEVERAL SERVICES can often pay off with savings in the overall electrical bill. Charted are the demand records for three adjacent plants. It shows that, if otherwise economically justified, one meter in place of three would save about \$2,000 each year.

and substations for physical, legal, or policy reasons.

Single high-voltage service, several substations

Use of a single high-voltage service to a central switching or transforming substation for distribution at high or intermediate voltage to several unit substations gives high capacity and flexibility.

When a utility supplies service at a voltage higher than 480, it might be at any one of several values. As examples, 4,160 and 13,200 v. are selected here. As long as the potential is below 15,000 v., it may be brought into the plant with reasonable ease

without very expensive precautions in wiring methods. Notice that for a given load the amperes at 4,160 v. will be only about 1/17th and at 13,200 v. only about 1/55th those at 240 v. A service designed for 120 amp. at 13,200 v. would make available approximately 3,000 hp. This load would require almost four 3,000 amp., 240 v. services. Such capacity would serve for a long time.

By distributing these higher voltages from a central point radiating out to unit substations at strategic locations about the plant, large blocks of power can be carried through relatively small wires and conduits. Transformation through unit substations to

Service voltage	Entrance conductor 50 ft. long	Switch amp.	Available hp.	hp. per dollar	Dollars per hp.
A. 240.....	3-500mcm, 3 Cond.	400....	150.....	.115.....	\$ 8.69
A. 480.....	.....(same).....	400....	300.....	.230.....	4.35
B. 240.....	3,000 Amp. Bus...	3,000....	800.....	.065.....	15.39
B. 480.....	.....(same).....	3,000....	1,600.....	.130.....	7.69
13.2kv....	3 #2 paper lead-in.	400....	3,000.....	.103*	9.71
C. 13.2kv....	3½ in. Cond.....	400....	3,000.....	.667**	1.49

* Power company owns transformers, customer provides primary service and switch and secondary switch.

** Customer owns transformers, secondary distribution switches not included. The cost of the transformers was not included because they would be paid for from the reduction in energy charges for primary metering or the savings effected through unification of several services, as previously discussed.

COMPARATIVE COSTS indicating the available horsepower per dollar invested at various loads are listed in table above. The costs are estimated at current prices for both material and labor, and are intended only to show a relationship rather than an estimating guide.

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

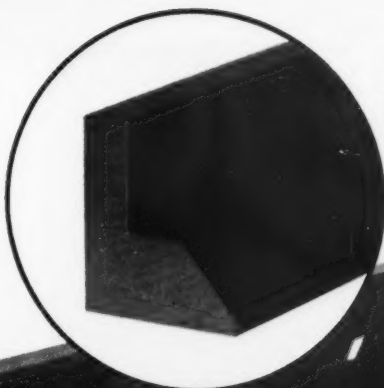
230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton, and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y.
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REVERE COPPER EXTRUSION shown attached to skirtboard before full assembly, which you can see below in exploded view. A matching bar, similar to the one shown is part of the "packaged" HANCO unit and is fastened to the opposite side of the screen. Units, in turn, are installed on the various types of Vibrating Screens made by HEWITT-ROBINS INC., Passaic, N. J., and are known as the HEWITT-ROBINS HANNON Electric Screen Heaters.

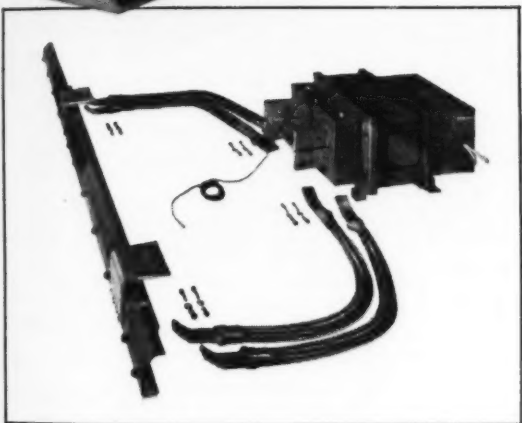
CLOSE-UP showing end of the Revere Copper Extrusion.



Revere Copper Extruded Shape

in Hanco Electric Screen Heater

out-performs
former copper casting
on 4 counts



"Customers of F. R. Hannon & Sons are now assured of many years of maintenance-free performance plus improved products."

Says T. W. HANNON, Vice-President,
General Manager
F. R. HANNON & SONS, Canton, Ohio

Mr. Hannon continued, "For a number of years we had experimented with many different types of materials which would be non-porous, free from any burrs or voids, capable of maintaining a straight leading edge and able to carry 1500 amperes at 5 volts. The Revere Copper Extrusion meets these requirements. And for the rugged use to which our machines are put it would be virtually impossible to maintain satisfactory operating results without the use of this extruded electrical conductor."

Perhaps there is a Revere Product that can help you give your customers a superior product, or help cut your production costs. You'll never know until you call the Revere Office nearest you and ask to have a T. A. (Technical Advisor) call. Why not make that call today?

Here's the Score!

COPPER EXTRUDED SHAPE

- 1—12 foot mill lengths offer flexibility, eliminating both welds and scrap
- 2—Shape offers lack of porosity
- 3—Shape straightness is superior to casting, giving better electrical contact
- 4—Higher cost per foot, but cheaper over-all installation

COPPER CASTING

- 1—60" casting required additional welded joints
- 2—Casting gave porosity problem
- 3—Bow in casting presented difficulty when fastening screen firmly to contact
- 4—Initial cost was lower, but additional welds and scrap resulted in higher final cost, and an inferior finished product

REVERE COPPER AND BRASS INCORPORATED

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SAN FRANCISCO:
116 New Montgomery St. Sutter 1-0282

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... for more details, circle No. 34 on Reader Service Postcard



Houston Paper Company, Houston, Texas:

We chose **Sturdi-Bilt Adjustable STORAGE RACKS** ^{*}

because they are

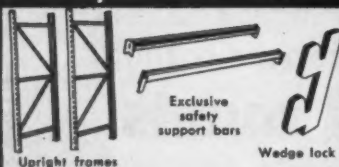
**EASIER
TO ERECT**

**SIMPLER
TO ADJUST**

**COST LESS
TO EXPAND!**



Only 3 Basic Parts

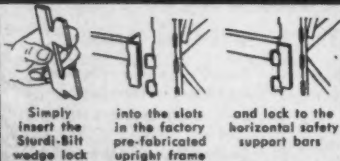


Upright frames

Exclusive safety support bars

Wedge lock

WITH EXCLUSIVE Float Wedge Construction



Simply insert the Sturdi-Bilt wedge lock

into the slots in the factory pre-fabricated upright frame

and lock to the horizontal safety support bars

Instantly Interchangeable for



PALLETS

BULK

SKIDS

DIES

104 RACKS INSTALLED IN 30 MAN HOURS BY "GREEN" LABOR

Less than 1/2 of 1% of material cost!

The Houston Paper Company, Houston, Texas, was "sold" on Sturdi-Bilt Adjustable Storage Racks the moment they saw a demonstration of exclusive "Float Wedge Construction"!

No other rack could match Sturdi-Bilt's speed, low cost and ease of installation—

WITHOUT TOOLS, BOLTS, NUTS, ERECTION WELDING OR SPECIAL LABOR (Installed cost of Sturdi-Bilt was actually 1/2 of 1% of cost of material compared to others 4% to 17%).

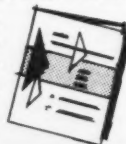
No other rack offered Sturdi-Bilt's flexibility—INSTANT RESPACING, REARRANGEMENT, EXPANSION OR RELOCATION AT ANY TIME—WITHOUT TOOLS—NO PARTS LOSS!

Looking to future expansion—Houston Paper Company considered Sturdi-Bilt's low cost for add-on storage facilities—

ALL COMPONENTS ARE STANDARD, PRODUCED WITH THE ECONOMIES OF PRODUCTION RUNS!

Write for details of how this new time-saving, money-saving, work-saving storage system can benefit your company, too! WI-9

^{*}U.S. Patent No. 2760650
Other patents pending



Sturdi-Bilt Engineering Co.
2501 Peterson Ave., Chicago 45, Ill.

DISTRIBUTED BY
Andrey Co., 2479 Fletcher, L. A., Calif.
M. E. Canfield Co., 419 E. 3rd, L. A., Calif.
Green-Penny Co., 421 E. Washington, L. A., Calif.

A CHECKLIST

What to remember in choosing your electrical system . . .

1. Some type of bus-bar service-entrance conductor and large-capacity low-voltage switch should be the minimum equipment for all but very small plants.

2. When a plant is likely to have 800 hp. initial load with capacity to grow, twice as much load can be accommodated at the same expense if the utilization voltage is 480.

3. It will be less expensive to wire the plant for 480 v. in the beginning than to start at 240 v., converting later to the higher voltage.

4. The cost of a minimum primary service with secondary metering will be intermediate between the cost of 240 and 480-v. services, but is capable of twice the load.

5. If studies, such as those discussed in this article, show that company ownership of all high-voltage equipment, including transformers, will secure a rate sufficiently favorable to pay out the cost in a reasonable time, this will be the most desirable design.

6. In a widely scattered plant, primary distribution with local unit substations will provide great flexibility and reduce length of low-voltage feeders.

7. Adequate interrupting capacity must be provided in the switchgear and protective devices.

Note: Many other factors must be kept in mind when choosing one of many possible solutions. Only a comprehensive knowledge of plant conditions and management policy can assure that a properly engineered design will provide the plant with capacity adequate for the present load and future growth.

the lower utilization voltages reduces the length of large low-voltage wires, voltage drop, and costs to a minimum. If service continuity is of sufficient importance primary or secondary loops can be incorporated, but this is



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Brand since 1883

*The Palace Hotel photographed 40 years ago, when Marwedel
had already been representing Starrett for 33 years*

NEW STARRETT MAGNETIC BASE INDICATOR HOLDER ELIMINATES CLAMPS...ATTACHES TO ANY STEEL SURFACE!

Here is an indicator holder with a powerful, permanent magnet-type base that holds firmly when placed horizontally, vertically or upside down. Magnetic force can be turned on or off just by pushing a button. It shortens set-up time on any job requiring a dial indicator. It is another fine instrument manufactured by Starrett.

The complete Starrett line has been distributed by C. W. Marwedel & Company for 73 years. It is another of our more than 100 famous brands of tools and industrial supplies. For the finest in service and supplies, call Marwedel!

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NORTHERN CALIFORNIA FOR THESE
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Challenge Surface Plates
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your metal cleaning dollars with **PERM-A-CLOR** (trichlorethylene)

Your dollars will go a lot further if you buy a premium grade solvent. Detrex Perm-A-Clor is a premium grade trichlorethylene . . . available at the same price as ordinary solvent. Perm-A-Clor is mighty important to you because it:

- 1 *Assures less maintenance cost*
- 2 *Is easier to control*
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- 5 *Is more highly stabilized, thus lasts longer*

You get all these benefits, plus expert service assistance, for the same price as ordinary solvent. The result is that with Perm-A-Clor your production costs are reduced because you use fewer gallons of solvent per month. Mail the coupon for complete information.

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DEGREASERS • DEGREASING SOLVENTS • WASHERS • ALKALI
AND EMULSION CLEANERS • PHOSPHATE COATING PROCESSES

... for more details, circle No. 37 on Reader Service Postcard

beyond the present discussion of service equipment.

Cost of energy

Unless there is available a power schedule which will permit the combining of the demands and kilowatt hours for several services, the billing for the energy consumed will be higher when more than one meter is used to measure the plant's electrical requirements.

There is a possibility that the cost of combining several services into one to permit measurement of energy through a single meter can be paid off by the savings in the electric bill. Depending upon the applicable rates and the length of the operating season, the cost would be paid out in a number of years. An accompanying chart shows such a saving. The actual number of years required would be determined by a detailed study of the individual problem.

Distribution of energy charges

In the case of one service for several plants, there arises the matter of charging each plant with its share of the electric bill. The apparatus to meter high-voltage (over 480 v.) is expensive so it would be best, where possible, to install metering for each plant division on the low-voltage side of unit substations. As the utility's primary metering includes the losses in the lines and transformers, a difference between the utility meter and the sum of several low-voltage meters will appear. This difference could be prorated and added to the consumption shown by each of the low-voltage meters.

Cost of service equipment

Only careful design and estimating can establish the costs per available horsepower to provide service equipment at the various voltages. This discussion deals only with the electric service equipment as far as the "main switch." It includes the high or low-voltage entrance conductor and the first switch which controls the entire load. The distribution of electric energy beyond this point can be so varied that it is not taken up here.

MOTOR CONTROL PROBLEMS? SPEED REDUCER PROBLEMS?

THEN DON'T MISS the listing of today's 20 best motor control manuals on page 75, and 35 best speed reducer and gearmotor manuals on page 79 of this issue. Your selection is free for the asking. Use the WI Reader Service Postcard, on page 109 this month.

Now . . . complete stocks, prompt deliveries

of Aluminum rod, bar and wire

from any of the **8** Western warehouses

of

Clingan & Fortier

**Complete
warehouse
stocks**

. . . of rod, bar and wire in all sizes and shapes are only a phone call and a short delivery time away from any Western plant or shop.

You can rely on Clingan & Fortier for fast, courteous Western service . . . for regular shipments and emergency requirements that simplify your storage and inventory problems.

**Experienced
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When you phone our customer service specialists, you talk with trained and qualified men who know the application advantages of aluminum rod, bar and wire in terms of *serving your particular needs best!*

**Fast, personal
attention**

On orders of any size . . . every time you need aluminum, phone your nearest Clingan & Fortier warehouse **FIRST**. You'll get the *exact* aluminum rod, bar or wire you need . . . *when you need it!* We believe our specialized aluminum service will please you and pave the way for *more* calls.

The number of Western plants and shops that have switched to Clingan & Fortier's combination of *specialized service and dependable quality* is growing steadily. Call **TODAY!**

ALWAYS CALL . . .

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. . . for more details, circle No. 38 on Reader Service Postcard

How to be sure when you're buying gears

Do you know how to select exactly the right gears to fit your needs? . . . and how to search out most appropriate gear values? Price and size are not the only factors to consider.

THERE IS HARDLY a skill known to the world which is not covered these days by countless pocket editions of the "How to . . ." series.

"How to Trap a Platypus"
"How to Half Sole a Pair of Snowshoes"
"How to Be Happy Tho' Married"
"How to Barbecue a Hippopotamus"

These are but a few of the sparkling activities whose mysteries may be explored and whose directions may be exploited by simply making a quick trip to the corner drug store.

And now—"How to Select Gears," surely not the most fascinating or the most glamorous of activities, but certainly one of absorbing interest to the design engineer, purchasing agent,

plant manager, production superintendent, or any builder or user of gear driven equipment. The success of his business and the performance of his equipment is vitally dependent on buying the finest gears, backed by a reputable gear manufacturer with a

vigorous service organization, and at economical prices.

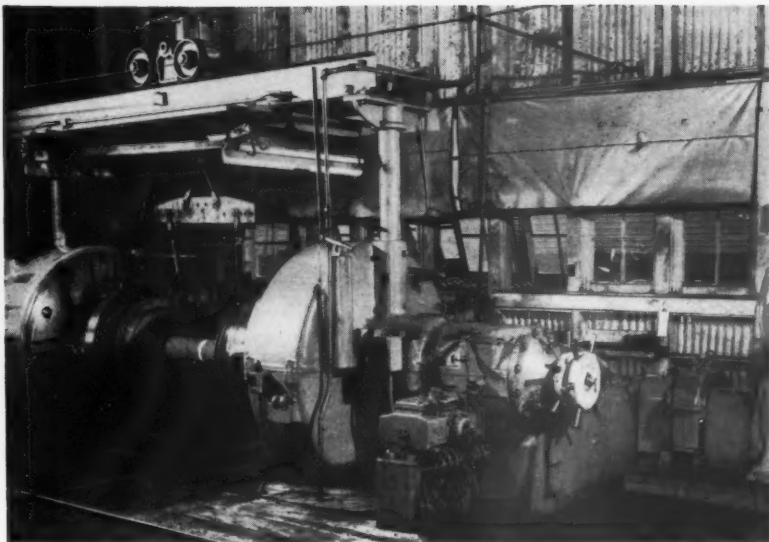
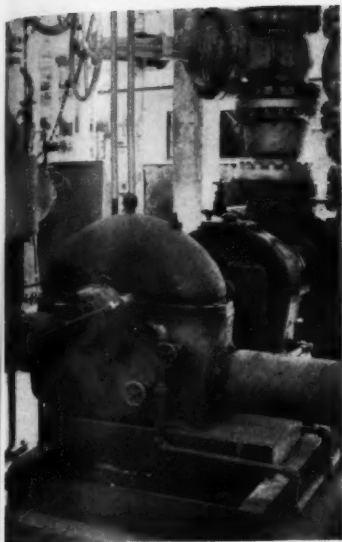
To begin with, it's important that you know about AGMA (the American Gear Manufacturers' Assoc.), a clearing house of knowledge on gears. AGMA is an association of America's leading gear manufacturers, existing for the purpose of establishing standards, ratings, materials, formulae, etc., to provide industry with standard methods of gear size selection. Gear firms' engineers are actively engaged in committee work, striving constantly toward these ends. Obviously, the purpose of this body is to improve gear products, to establish standard rating methods, to protect the gear user from inferior materials, and to assist him in making intelligent selections through the help of its members.

Before going into some typical examples of gear selection by AGMA procedure methods, we should take time out to clarify what AGMA does not do. While it is true that "yardsticks of measurement" are pretty well established, there is no such thing as a "yardstick of value," since AGMA members are under no restrictions on how much added value (plus features) they may build into their reduction gears, gear assemblies, or a single loose gear. AGMA exerts no jurisdiction over member pricing policies. Considerable variation will be found in the construction and design of various gear manufacturers' products, but the AGMA member must conform to specific minimum standards.

A good example of how the buyer must search for and seek out the best value, for instance, would be the selection of a *herringbone, double reduction, parallel shaft gear reducer*. To illustrate the factors involved in mak-

COMPARISON OF 8 LEADING MAKES OF GEAR REDUCERS OF APPROXIMATELY SAME CATALOG HORSEPOWER AND RATIO AT 1,150 RPM. INPUT

Gear Manufacturer	Ratio	Catalog Horsepower	Mainshaft Dia.	Shaft Center Distance	Weight
"A"	28.4	107	6 in.	30 in.	4,590 lb.
"B"	28.7	117	6 in.	30 in.	4,000 lb.
"C"	28.1	112	5 $\frac{7}{8}$ in.	32 $\frac{1}{2}$ in.	4,050 lb.
"D"	26.8	115	5 $\frac{3}{4}$ in.	28 in.	4,000 lb.
"E"	28.6	107	5 $\frac{1}{4}$ in.	34 $\frac{1}{2}$ in.	3,500 lb.
"F"	30.0	117	5 $\frac{1}{2}$ in.	28 in.	3,400 lb.
"G"	27.5	113	5.1875 in.	28 in.	3,100 lb.
"H"	27.1	111	5 in.	25.214 in.	2,400 lb.
Summary	26.8 to 30.0	107 to 117 Horsepower	5 in. to 6 in.	25 in. to 34 $\frac{1}{2}$ in.	2,400 lb. to 4,590 lb.



ON STEAM TURBINE DRIVES in a Western refinery, economical medium speed herringbone gears (2,250 to 3,600 rpm.) replaced costly high speed turbine gears for average requirements of 20 to 200 hp.

ing a wise selection, the table at the bottom of page 60 provides a comparison of eight leading makes. All of the gears listed conform to the minimum standards of AGMA.

Caveat emptor (for gears, too)

What conclusions can be drawn from the table? One significant fact is that, although reasonably close in horsepower rating at a service factor of 1, Manufacturer "A"'s gear offers more than twice the weight of "H"'s. And the lighter gears with the smallest main shaft diameters and shorter center distances claim the greater horsepower ratings. Obviously, these gears are more closely tailored to minimum standards, and offer the buyer a minimum of reserve. Analysis, pricewise, would reveal considerable variation, and units offering minimum

CONVERSION TO HIGH SPEED OPERATION of this originally low speed car wheel turning lathe at Southern Pacific's Los Angeles shop was completed at 10% the cost of a new machine through use of a Lufkin Gear Increaser driven by a Varidrive electric motor. Conversion of similar lathes has been made subsequently at SP's shops in San Francisco, Stockton, and Portland. (Both photos by Lufkin Foundry & Machine Company.)

design will often bear higher price tags than their heavier, more conservatively built counterparts.

Something not mentioned in most gear catalogs is bearing life. AGMA minimums will permit from 25,000 to 30,000 hr. average life. The more conservatively designed of Gears "A" through "H" as listed in the table will offer bearings of 100,000 hr. or more average life.

It will pay a gear user to screen carefully the design features offered by individual gear manufacturers. A gear possessing the greatest combination of refinements will not always necessarily be the most expensive. Quite often, price may be in the lower economic brackets, due to specialization and high production by the manufacturer. Therefore, the old Latin term *caveat emptor* or "Let the buyer beware," prevails even in proper gear selection.

A good deal of confusion and bewilderment seems to exist among users of right angle drives when trying to compare worm gears with spiral bevels, due to the different AGMA terminology for the two types of gears, and due to differing service factors for the same kind of duty. Some illumination of this subject seems to be in order.

Clarification of service factors

First of all, *worm gears* are broken down into Classes 1 through 5 for varying types and duration of duty by AGMA, and each class has a specific service factor value, except Class 5, which goes by torque. *Spiral bevel drives* are not so classified. Service factors for these drives are selected in the same manner as for herringbone and helical gear drives, e.g., by "Character of Load."

For clarification, here is an explana-

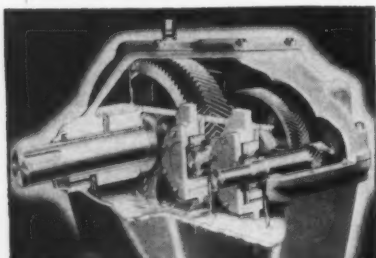
AUTHOR OF THIS ARTICLE



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Manager
Industrial Gear Div.
Lufkin Foundry
& Machine Co.
Los Angeles, Calif.

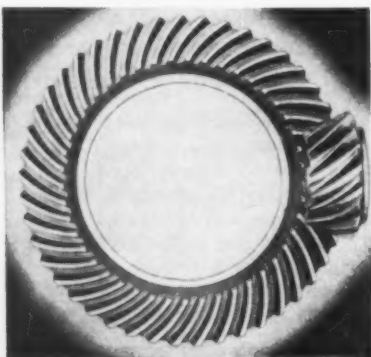
"Vic" Fawcett mentioned to WI editors many months ago that he thought Western buyers and users of gears needed certain types of basic information to aid them in making intelligent selections to achieve efficient and economical gear operation. This article is the result, compressing into limited space his broad knowledge gained from 20 years' observation of gear application in the West. A member of many technical societies and a native Westerner, Fawcett joined Lufkin in 1934, working with gear users in Southern California, and in 1950 was placed in charge of the Lufkin, Tex., firm's Pacific Coast industrial operations. Since then, except for a Middle East assignment to direct Turkish engineering personnel in the use and care of geared equipment, he has been working closely with gear distributors and gear users in all of the West's manufacturing and processing industries.

TYPES OF GEARS



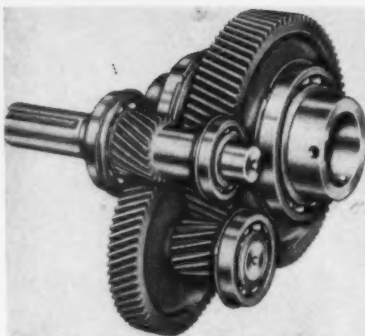
Photo—Lufkin Foundry & Machine Co.

HERRINGBONE GEARS—external herringbone or double helical gears are used when both high speeds and high horsepower are involved. When thrust exceeds limitations of single helical gears or plain bearings are used to support the gears, herringbone gears are used. External types have been built to carry as much as 60,000 hp. on a single pinion and gear. This type of gear is used in oilwell pumping, paving plants, pumps, fans, compressors in refineries, conveyors, compressors, pumps in chemical plants, pulp and paper mill operations, lumber mill operations, rubber mill drives, on cranes, hoists, elevators, cement mills, pipeline pumps, and in steel rolling mills.



Photo—Gleason Works

SPIRAL BEVEL GEARS—have curved, oblique teeth which are cut or ground to run with localized contact. Their gradual tooth engagement and overlapping tooth action results in smooth and quiet operation at high loads and speeds. This type of gear is commonly used in cooling tower fan drives, steel rod and tube mills and mining machinery, pulverizers, boring mill table drives and machine tool applications, marine propeller drives, winches and cranes, turbine drives, farm machinery, truck drives and earth moving equipment, aircraft accessory and high speed drives, helicopters, deep well pumping drives, printing presses, power hand saws, drills, nut setters, grinders, cloth cutting equipment and instruments.



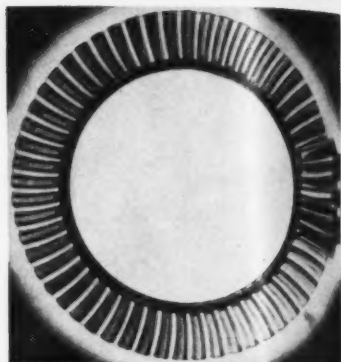
Photo—Dodge Mfg. Corp.

HELICAL GEARS—sloping teeth of a helical gear are generated in the cutting process and they provide an infinite number of thin gears in parallel, each of which comes into contact with the mating gear slightly behind the other, reducing chance of tooth error trouble. Noise problems often encountered in spur gears is eliminated with this type gear.



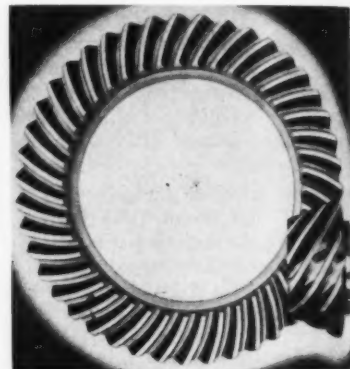
Photo—J. W. Minder Chain & Gear Co.

SPUR GEARS—are relatively simple in design and most equipment manufacturers prefer to use them where design requirements permit. Although they are usually thought of as slow speed gears, spur gears can be used at almost any speed if noise is not a consideration. Teeth, perfectly straight and parallel with the axis of rotation, may be cast or machined. Practical speed ratios run up to 10 to 1, but more-than-average noise is produced when operating at speeds over 1,000 fpm. Spur gears are available as internal as well as external units. When straight line motion is desired, it can be obtained through use of a spur gear and a rack.



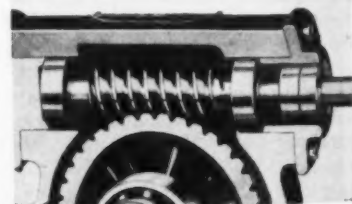
Photo—Gleason Works

ZEROL BEVEL GEARS—have curved teeth with zero spiral angle and localized tooth contact. They operate with the same thrust and tooth action as straight bevels. Commonly used in aircraft propeller reduction units, instrument planetary and differential systems, marine applications, reversing gears, and paper mill and steel mill shear drives.



Photo—Gleason Works

HYPOID GEARS—are similar to spiral bevels except for offset between the pinion and gear axis. They operate more smoothly than spiral bevels, can be used for higher ratios, and have increased strength of pinion member.



Photo—Abart Gear & Machine Co.

WORM GEARS—are ordinarily used on right angle drives when very high ratios are needed. They are also widely used in low to medium ratios as packaged speed reducers.

KINDS OF GEARS IN COMMON USE

PARALLEL AXES

Herringbone or helical external
Herringbone or helical internal
Spur external
Spur internal

INTERSECTING AXES

Straight bevel
Spiral bevel
Zerol* bevel
Face gear

NONINTERSECTING NONPARALLEL AXES

Crossed helical
Single enveloping worm
Double enveloping worm
Hypoid

*Registered trade name—see picture above.

tion of different classes of worm gears.

CLASS 1—Service Factor=1 (Normal 4-10 hr. service, free from recurrent shocks, that is, shock loads that recur at even or frequent intervals. Multiply input horsepower by service factor of 1.0.)

CLASS 2—Service Factor=1.2 (8-10 hr. service where recurrent shock loading is encountered or 24-hr. service where no shock load is experienced.)

CLASS 3—Service Factor=1.3 (24-hr. shock load service.)

CLASS 4—Service Factor (Fractional) (Intermittent service where worm is operated at speed of 100 rpm. or more. Actual input horsepower is multiplied by varying factors from .6 to .9, depending upon frequency and the duration of the load.)

CLASS 5—For Class 5 service, rating of gear set is always given as output torque rating. The output torque rating for worm speeds below 100 rpm. is obtained by converting horsepower rating at 100 rpm. to output torque. To determine output torque rating of gear set, the following formula should be applied:

$$T = \frac{P \times 63,000 \times Mg \times N}{n}$$

Where T=Output torque rating in pound inches

P=Input horsepower rating

n=Worm speed in rpm.

Mg=Gear ratio

N=Gear efficiency

(100-Ratio)

$\frac{\text{---}}{2} = \text{percent}$

The efficiency of worm gears will run between 90% to 95% up to ratios of 10 to 1. Over 10 to 1 ratio, efficiency is equal to $\frac{100 - \text{Ratio}}{2}$

For example:

Gear ratio = 60 to 1

Efficiency = $\frac{100 - 60}{2}$

= 70%

Now, as a direct comparison between worm and spiral bevel or helical gears, the following service factors are recommended for a specific type of duty:

Recommended AGMA Service Factors for Cooling Tower Induced Draft Fan Duty
(Released as currently adopted by Cooling Tower Institute, Palo Alto, California.)

Type of Gearing	Turbine or Electric Motor	Multi-Cylinder Gas Engine
Spiral bevel	1.5	1.75
Helical	1.5	1.75
Worm gear	1.2	1.3
Double enveloping worm	1.2	1.3

In the past, it is our understanding that spiral bevels, herringbones, etc., were referred to by classes, like worm gears are today, but this is no longer

Tips from Westerners on buying gears

Here are actual comments from a number of Western gear users describing factors they find important in gear selection. Check your thinking with theirs:

FROM THE OILFIELDS—Tal Ledbetter, Southern Division Superintendent, Production Department, Union Oil Co. of Calif., says, "Oilfield pumping imposes sudden and severe loading on reduction gears. Heavy shock loads and load reversals occur with each cycle, 24 hr. per day, 365 days per year. Price is secondary to performance where trouble-free, uninterrupted performance is imperative. Only those gear manufacturers with outstanding performance records in oilfield duty are considered."

POWER TRANSMISSION SPECIALISTS—Ernest Minder, President, J. W. Minder Chain & Gear Co., Los Angeles and Portland, says, "In our thirty years as specialists in the manufacturing and distribution of power transmission equipment on the Pacific Coast, we have learned by practical field experience that, in the selection of gear drives, price should not be the determining factor and is never a substitute for quality."

FOR THE COOLING TOWER INDUSTRY—James G. De Flon, Manager of Engineering, The Fluor Products Co., Whittier, Calif., insists, "In selecting right angle spiral bevel gears for induced draft cooling tower fan drives, the purchaser should insist that the gears be rated in accordance with American Gear Manufacturers' Assoc. standards using a service factor of 1.5 for 24-hr. continuous duty, electric motor drive. A gear rated 30 hp. by AGMA will have a rating in excess of 60 hp. by the Gleason scale of top hardness. Horsepower ratings mean nothing unless the buyer is aware of the process by which the rating was obtained."

... and J. J. Finnerty, Purchasing Agent, Cooling Tower Dept., Foster Wheeler Corp., San Mateo, Calif.: "When placing an order, a Cooling Tower Manufacturer OEM desires for induced draft fan service (1) That the gears furnished be manufactured in accordance with AGMA's standard practices and that the gears be certified to this effect. (2) That spiral bevel gears have the recognized AGMA service factor of 1.5, for 24-hr. duty, using electric motor. (3) Bearings must have a minimum B-10 life of 30,000 hr. (4) Gears must have a long record of proven dependability in cooling tower service."

"Price and delivery are prime requisites," says Mr. Finnerty, "but equally important is the reliability and adequacy of the vendor's service force and design features of the gear relating to maintenance and repair."

IN A CHEMICAL PLANT—Dick Grundman, Chief Design Engineer, American Potash & Chemical Corp., Trona, Calif., seeks clarification. "We'd like to see uniformity and clarification of different gear manufacturers' methods of rating gears. Can't someone do something about giving us standard methods to make intelligent comparisons?"

HIGHWAY EQUIPMENT—K. A. Anderson, Purchasing Agent, Madsen Iron Works, Construction Equipment Div. of Baldwin-Lima-Hamilton Corp., La Mirada, Calif., remarks, "A gear is only as good as the service organization behind it. Gear reducers employed in our paving plants must conform to AGMA standards and must be of rugged, sturdily built construction comparable, for example, to the design employed by the oil industry in heavy duty pumping service."

FOR AIRCRAFT TESTING APPARATUS—Carl Starbeck, Design Engineer, The Arnold Corp., Santa Monica, Calif., looks at gears this way. "Today, more than ever, precision workmanship and quality materials are imperative in the manufacture of aircraft equipment, whether of the airborne or ground supporting type. Gears employed in our manufacture of various testing apparatus must meet the most exacting standards, and have the backing of a good service organization."

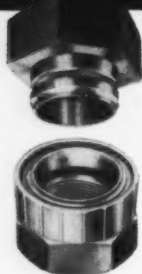
FOR HEAVY DUTY PIPELINE AND BOILER FEED PUMPS—Ed Lindsey, Regional Sales Manager, Byron Jackson Pumps, Inc., a subsidiary of Borg-Warner Corp., states, "Gears used in conjunction with our pumps must have proven performance history and must have the backing of a vigorous, readily obtainable service force. The reputation and performance of our products are partially dependent upon satisfactory operation of products manufactured by others."

IN LUMBERING AND MILLING OPERATIONS—U. S. Plywood Corp's Bob Cox, Design Engineer of Associated Div., Gold Beach, Oregon, puts it this way, "Only the most ruggedly built equipment will stand the gaff in lumbering and log handling operations. Heavy shockloading is the rule and gear reducers in our plants must perform under such punishment year after year."

IN PIPE ROLLING AND TANK MANUFACTURING—Earl Babbitt, Production Engineer, Beall Tank & Pipe Co., Portland, Ore., has this to say: "Shaping and forming of steel, hot or cold, imposes severe peak loads and stresses on pipe rolling reduction gears, probably not exceeded in many other industries. Gears themselves must be good—shock resistant and durable—but equally important, housings must be heavy duty, heavy wall thickness, and heavily ribbed so that separating forces cannot disturb perfect shaft and gear tooth alignment."

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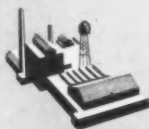


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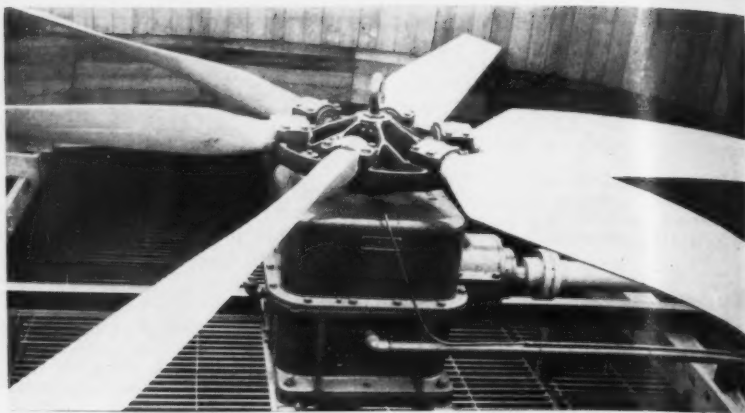
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SPIRAL BEVEL GEARS, highly specialized and highly efficient for the application, have largely replaced standard automotive transmissions for severe 24-hr. duty in driving cooling tower fans. Here, a 60-hp. right angle spiral bevel gear reducer, ratio 9.17 to 1, in induced draft cooling tower service. (Photo by Lufkin Foundry & Machine Co.)

true, as demonstrated by the foregoing tables and examples.

Rating spiral bevels

Horsepower and hardness go hand in hand in the rating of *spiral bevels*. just as in other types of gears. A very considerable increase in the materials factor and hence in the horsepower rating is obtained, theoretically, by going to a minimum hardness of Rockwell "C" 60.

Therefore, it is very apparent that the point of the matter is the hardness held to by the manufacturer. AGMA recognizes the impracticability of maintaining and guaranteeing the manufacture of spiral bevel gears beyond its published top hardness of Rockwell "C" 55 which stops with a materials factor of 1.0, and its obvious protection to the purchaser. Conservative engineers will readily see that if it were possible to maintain the highest hardness, no gear manufacturer would offer gears except with the use of higher hardness, thereby being able to offer the highest possible horsepower with the least material used.

Step-by-step gear selection

For an example of the factors that must be considered in the selection of a gear to do a given job, let's suppose you need a right angle spiral bevel gear to drive a 20-ft. induced draft cooling tower fan and that the source of power is an electric motor. AGMA bulletins, and manufacturers' literature based upon AGMA standards, provide tables indicating the shock loads to be expected from various drive situations.

First step is to consult such a table. The finding in this case would be that your cooling tower fan drive will be

operating under moderate shock load conditions. Other tables in the same engineering literature have been set up to indicate the service factor to be expected from various prime movers under every possible duration-of-service condition for different load conditions. Using such a table, and supposing the drive will be operating 24 hr. a day, you would find that a service factor of 1.50 is indicated.

Next factor to be considered is horsepower catalog rating desired in the drive. The actual horsepower to be transmitted in this case is 100 hp. Horsepower catalog rating is determined by multiplying the transmitted horsepower by the service factor; or 1.50x100 hp. giving you a 150-hp. catalog rating.

Take a close look at efficiency

Before actually referring to manufacturer catalogs for selection of the gear unit, you should consider efficiency that can be expected from the type of gears involved as governed by the ratio of speed reduction. This factor hinges upon whether you can select a single, double, or triple reduction gear unit. For the sake of our cooling tower fan drive example, we will use an output speed from the motor of 1,750 rpm. and a desired speed of the fan of 175 rpm. This ratio of reduction, 10 to 1, can be handled by a single reduction gear unit. Engineering literature from AGMA or manufacturers of gear products lists this information. Other tables in the same literature will tell you the efficiency you can expect from a single, double, or triple reduction unit employing any given type of gear; you would find that your right angle spiral bevel gear unit, in a single reduction model, would perform at 98-98.5%

EUTECTIC WELDING NEWS



Plant, Research Laboratories and World Headquarters

PUBLISHED BY EUTECTIC WELDING ALLOYS CORPORATION, 40-40 172 STREET, FLUSHING 58, NEW YORK, N. Y.
 Warehouse-Service Centers in Atlanta, Chicago, Dallas, Berkeley, Montreal (Quebec), and other leading industrial areas.
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LOW-KIRKSITE DIES CAN BE REPAIRED EASILY

Modern metallurgy has opened the door to a practical, low cost way to weld zinc die castings. This development by Eutectic Engineers permits repairing formerly discarded costly Kirksite dies.

Safe, sure, fast welding of zinc die castings is assured with EutecRod 196, the modern "Low Temperature Welding Alloy" specifically formulated for zinc alloys. This advanced alloy now saves industry thousands of dollars by reclaiming damaged and worn castings. EutecRod 196 is an easy-to-use bead forming alloy, perfect for build-up of worn or missing parts.

The low heat required eliminates the need to fuse and possibly damage the parent metal as with conventional welding materials. This means rapid joining of zinc die castings without puddling or melting the base metal, and preclusion of distortion or warpage caused by high heat. EutecRod 196 is used with Eutector Flux 196, applied first and heated. Liquefaction of the flux indicates the proper temperature for application.

In addition to being a perfect color match for zinc die casts, EutecRod 196 is highly fluid. It can be used to join zinc die cast to other metals — brass, bronze, even aluminum. Large sections can be rebuilt by first melting the alloy on a cold plate and then joining the built-up alloy to the original part.



Welded Kirksite mold ready for service

TOOL AND DIE SHOPS SAVE THOUSANDS WITH TINNING

Carburizing steel for tools and dies presents problems. It is often desirable to have parts of the metal remain soft for ease of subsequent drilling. Many tools require threading after carburizing. The usual process of welding pads on the piece before carburizing, and then machining off the pad, often leaves surplus metal when the pad is cut off.

Using Eutect-TinWeld, a paint-on, solder-type paste, also a perfect tinning compound, saves thousands of hours and dollars. Simply paint it over the area to be kept soft or protected. A torch melts the Eutect-TinWeld which later runs off during the heat treating. The area where it was applied remains soft. Base metal should be clean and oil-free before application.

"LOW HEAT INPUT" INCREASES PRODUCTION 500%

Excessive, costly rejects while fusion welding three copper pipes to a machined bronze casting led an Eastern manufacturer of heating equipment to check for savings with modern fabricating.

The brazing technique was tried. 388 ounce of filler alloy and nine minutes were saved on each assembly. A Eutectic District Engineer then suggested a cost analysis test with EutecRod 1801, a special capillary thin-flowing high silver alloy used with Eutector Flux 1801.

The three tubes were pre-fluxed and set up simultaneously; a large torch tip producing a broad flame was used. When the flux liquefied EutecRod 1801 was fed into the joint. The moving torch plus the superior capillarity of EutecRod 1801 prevented localized overheating and distortion as uniform fillets formed around the entire circumference of each tube.

Even less skilled weldors produced perfect joints with thin flowing EutecRod 1801. Filler alloy required was cut from nearly two ounces of conventional alloy to 2/10 ounce of EutecRod 1801. Simultaneous joining of the three pipes increased production over 500%. The joints showed superior strength, corrosion resistance and "eye appeal." EutecRod 1801 reduced working temperatures at least 600 degrees F. Distortion and warpage were eliminated; the tubes perfectly parallel.



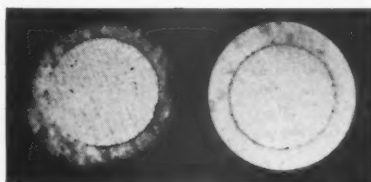
Overall view of the three fabrication methods. Left-fusion method showing heavy fillets, poor appearance and considerable distortion. Center-bracing results in better appearance, although still excessive fillets and some distortion. Right-EutecRod 1801 produces smooth, thin fillets and no distortion.

EUTECTRODE 2101 FOR ALUMINUM DRAWS APPLAUSE

A welding company writes us about "The remarkable performance of the new EutecTrode 2101 with extruded coating . . . in our early work, extensive tests were made using inert-gas arc, oxy-acetylene torch, and DC arc welding with commercially available aluminum electrodes, with hand dipped coatings. With EutecTrode 2101, we are able to get the desired quality of welds with 33% less preheat, 80% less rework to free slag in the difficult-to-reach areas, and with 25% less amperage. Superior wetting action with minimum spatter was apparent immediately."

Evidence of the superior performance of the new EutecTrode 2101 continues to

come in. Air brake assemblies developing cracks from freezing were repaired using EutecTrode 2101, saving hundreds of castings costing \$48.50 each. Spider ends of truck trailer wheels were repaired with fast melting, "Low Amp" EutecTrode 2101 without warpage or distortion. Housing for a Boston gear reduction unit was repaired in one hour with EutecTrode 2101 when mounting lug cracked. The repair was made with the lubrication left in the housing.



Conventional aluminum electrodes with hand dipped coatings (photomicrograph, left above) cannot provide the amazing arc stability, the absence of fingernailing and tailing, and the all-position weld-ability of the new EutecTrode 2101 with smooth extruded coating (right, above).

XYRON 2-25 SAVES \$20,000 CONDENSER

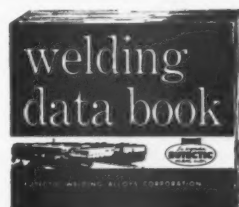
A West Coast manufacturer expected a costly salvage job on a smashed \$20,000 cast iron condenser. About 150 lbs. of the new, advanced, porosity and crack-free, strontium-aluminum bearing "Low Amp" Xyron 2-25 for cast iron and alloy cast irons produced a highly successful repair. "Eutectic's" ChamferTrode was used to chamfer out the cracks. The entire job was done in 99 man-hours.

Increasing use of nodular, ductile cast irons has introduced a new group of problems never before experienced in repairing and fabricating gray cast iron. Crack-free, Xyron 2-25 makes it ideal for the newest alloys. Its advantages over conventional nickel electrodes—essentially non-cracking and low heat input—makes it ideal for repair of cracked motor blocks, machine bases, motor and gear housings, transmission cases, cams, levers and for building up missing sections, filling in holes and defects.

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STYLE "H" SKY-VENT

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Where you need to ventilate large plant areas without devoting space and expense to a duct system — where you wish an installation that requires no floor or wall space — where you desire freedom to rearrange plant layout without re-working the ventilation system — and where you want a top ventilation job at minimum operating cost — you can't do better than with "Buffalo" Sky-Vent Roof Ventilators. These new units are already removing hot air, fumes and fogs from many of the country's largest plants. Rigidly constructed of heavy plate and bracing, these are permanent "package" units with all the "Q" Factor* smoothness and efficiency that typify all "Buffalo" Fans. Write today on your company letterhead for Bulletin FM-1234 and other descriptive material.

STYLE "H" SKY-VENT

Complete unit with fan in stack, shutters, integral flanged curb plate and internally braced heavy-gauge galvanized steel hood.

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Extremely heavy-duty with welded steel plate gussets supporting motor and propeller fan. Counterbalanced dampers in cylinder open when fan starts, close when it is stopped. Integral flanged curb plate simplifies installation.

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efficiency. This factor should be considered when actually selecting the gear unit from manufacturers' catalogs.

When selecting gears from manufacturers' catalogs, select a gear size that is horsepower-rated equal to or exceeding the value you have established as a horsepower catalog rating for your drive; in this case, 150 hp.

In conclusion we would like to make one broad recommendation to gear buyers, based on the sad experience of many purchasers over a period of many years: *select a gear with a service horsepower rating which is equal to or greater than the optimum horsepower rating of your prime mover and/or your driven machine.*

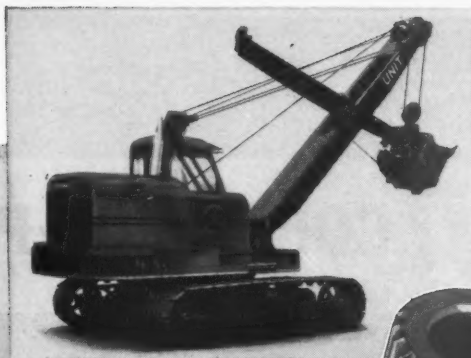
Here are ten more significant points to keep in mind when you are selecting and buying gears:

1. Gears should conform to American Gear Manufacturers' Assoc. standards.
2. Think of service. A gear product is only as useful as the organization that backs it. If the product is nationally distributed, be sure the gear manufacturer has national sales and service points.
3. Check for uniformity of selection and unit comparison.
4. Don't forget the importance of design, bearing life, case rigidity, and overall simplicity.
5. Remember that standard ratios are desirable for better delivery on original units and replacement parts.
6. Keep the "freight allowed" angle in mind. Most AGMA members allow freight to any railroad siding in the U. S. on standard gear units.
7. Check stocking or inventory costs of your standard gear requirements with gear source.
8. Lean on a reputable gear manufacturer for guidance in gear drive design best suited to your job.
9. Seek out a gear manufacturer specializing in your particular requirements.
10. Check the responsibility of the manufacturer for: (a) Repair parts' availability on old gears; (b) Proven service to industry.

ACKNOWLEDGMENTS

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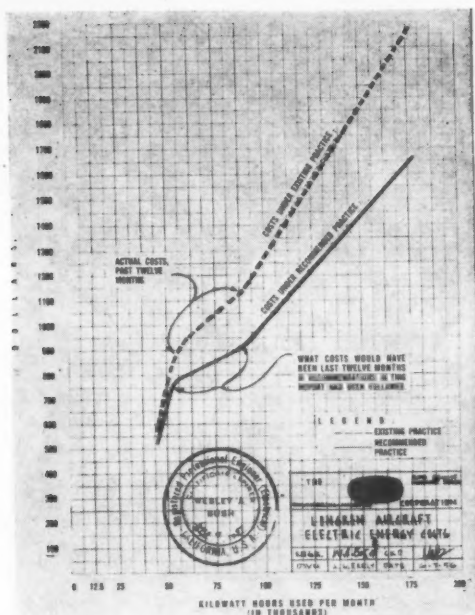
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WESTERN INDUSTRY — September 1956

A unique Western approach to utility cost control

Have a hunch your equipment is eating up too many energy dollars? Here's a new way to engineer savings you'd like.



TAKE A LOOK at the chart above. It illustrates the startling fact that nearly a 20% savings in electric energy costs is expected shortly at the Torrance, Calif., plant of Longren Aircraft Co. In dollars, it shows that although Longren has been paying about \$1,050 per month for its electric energy during the 12 mos. prior to June 1956, key procedural and equipment changes could have been utilized during that period to reduce the monthly electric bill to about \$850.

In addition, it graphically illustrates what these changes will mean in savings as consumption of electric energy at Longren increases from about 90,000 kwh. per month to double that consumption, at which point savings will move up toward 25%. And then Longren will be saving \$500 per month, \$6,000 per year.

Helping hand where needed

Savings like this can be important to a firm like Longren, a pioneer in developing metal working techniques for the aircraft industry, and growing fast. And Longren is typical of a thousand other expanding Western plants that are watching utility bills creep up but, without the time or capability for understanding complicated utility rate structures in relation to specific plant operating techniques, can't do much to hold them down.

Utility companies would, of course, like to see your plant operating at full efficiency and will lend much help, but they do not have the manpower

available to make up a detailed engineering report for each individual plant. Most plant managers and plant engineers, even though extremely capable, cannot be expected to search out these saving potentials in the specialized utility fields—electric, gas, and water.

Started in So. Calif.

Back of Longren's expectations for reduced operating costs is an unusual new consulting engineering plan that was formulated in Southern California and went into operation earlier this

year. It's the first such plan to our knowledge in the West, or in the entire U.S. for that matter.

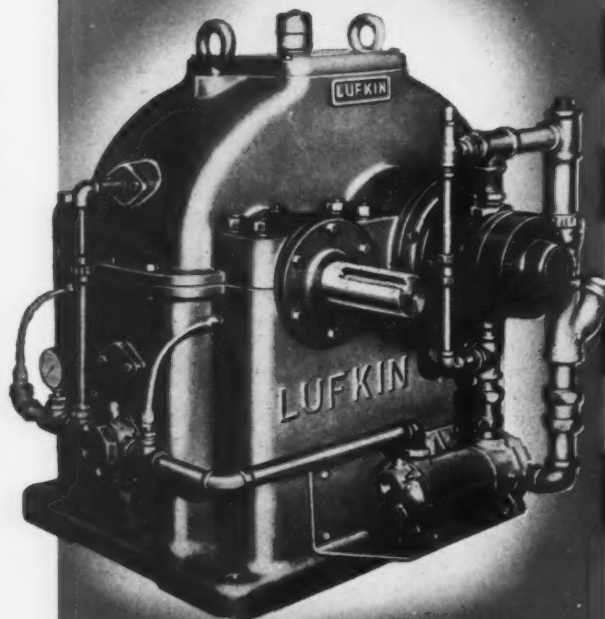
Initiator of the plan is Wesley Bush, an electrical engineer educated at the University of Arizona and past owner of several utilities as well as a designer of utility facilities in many industrial plants. A registered professional engineer in California and Arizona, Bush says about his new service, "The Savolt Plan of utility cost control embodies a completely new concept based upon thorough engineering analysis of the consumer's use of utilities in his particular operation to determine what



TALKING UTILITIES PROBLEMS in Longren Aircraft plant are Wesley Bush, founder of Savolt Corp. (far right), and John Podgurski, Longren plant engineer. Application of the Savolt plan at Longren showed possible savings of 20% in electric costs, 86% on water costs.

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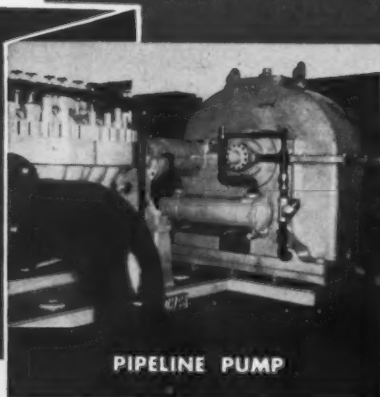
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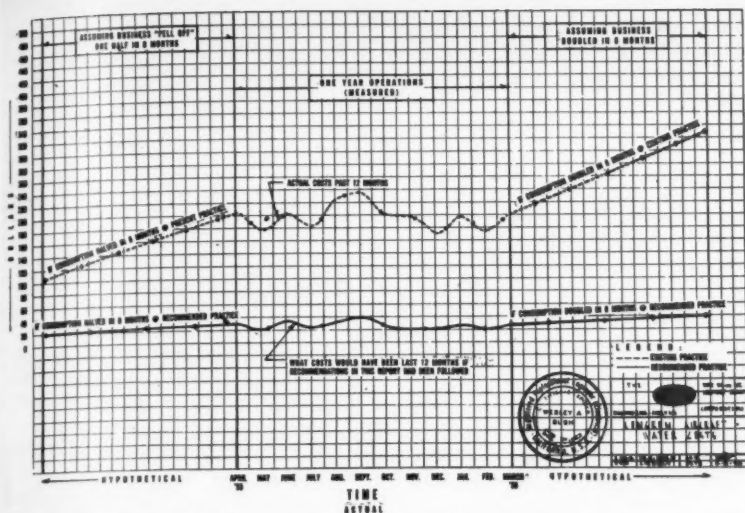
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ESTIMATED WATER COST SAVINGS, prepared for Longren by Savolt, show three eventualities: What costs would have been for past 12 months if report recommendations had been followed, and what expectations would be if manufacturing activity either "fell off" or increased. Latter possibility is of most interest to Longren.

refinements can be made and what rates are specifically applicable to that consumer." Bush has gathered together in his firm (known as Savolt Corp.) a staff of engineers prepared to work on the design of new facilities, extensions, or alterations on behalf of industrial utility customers.

No savings—no charge

Unusual features of the plan are that Bush and his engineers work in co-operation with the utility companies, and that no charge is made to industrial plants if savings are not shown. Thus, costs of the engineering survey, analysis, and report are not charged to a plant should no savings be indicated.

Returning to the example of Longren Aircraft as an illustration of the plan in action, Bush and his men were able to show Longren that: (1) substantial savings could be effected in both electrical and water utilization (17½% and 86% respectively, based on present usage volumes); (2) savings could be achieved in part by

rearrangement of plant utility facilities and in part by changed procedures in relation to rate structures; and (3) that savings would accrue in dollars if the engineering recommendations were followed, to an increasing degree as the firm expanded its plant facilities.

The other chart accompanying this report gives the picture for water costs at Longren (caption explains what it means).

More to come on how it's done

Other Western firms have been surveyed under the new plan, but WESTERN INDUSTRY does not have the space here to report specific results of these surveys. After experience records have accumulated during coming months, WI will enlist Wes Bush to describe in a later issue significant and detailed examples showing *how* plants participating in the plan utilized new approaches to cut plant operating utility bills. It will be "must" reading for economy-minded Western plant managers and engineers.

GEAR FOR INDUSTRY THE Lufkin LINE OIL FIELD PUMPING UNITS

SNEDDON SOUGHT FOR HIKERS' SOCIAL

Near Devil's Post
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luck would have it,
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sible to worry about
Lufkin Gears or
Lufkin Pumping
Units, who should
come thundering
across the meadow
but that well known
group — The John
Muir Hiking Soci-
ety.



V. J. Fawcett

Hot footed and
hot of breath, sweatin' and perspirin' and
just plain hot, we had the pleasure of en-
countering this same group last year about
this time.

It's too bad that our pal, Dick Sneddon, of
Los Angeles Petroleum Club fame was not
along, but as every member knows, (and
every oilman and his brother knows), Dick
had a date with Doc Sawbones recently, and
keeping up with a horde of hot footed hikers
is not on his Doctor's recuperation agenda.

"Bull Bunyon," Head Hot Foot of the hik-
ers' outfit, expressed for the group a hasty
and complete recovery for Dick, and with the
hope that he'll soon be back in good form.

Because of Dick Sneddon's intimate
knowledge of hiking, like the Loch Lomond
Hiking Society in his native Scotland, the
J.M.H.S. boys are eager to have Dick's ideas
—especially on how their group can econo-
mize—on such things as shoe leather, rat-
tions, breathing in "high" altitudes, and
things like that.

"Bull" and his bunch got a boot hearing
of a tale which Scot Sneddon claims is true
—that one cold morning in Glasgow, there
were literally thousands of Scots seen wan-
dering about with their mouths wide open—
because they had heard there was a nip in
the air!

Well anyway, since The John Muir Bun-
yon Builders' Bunch have reconciled them-
selves to Sneddon's absence this year for
their great annual gathering, known as the
I.A.H.M.C.A., that's short for the "Inter-
national and Amalgamated Hikers' and
Mountain Climbers' Association" social,
"Bull Bunyon" has this to say, "Be ready
next year, Dick, and save us a stash of those
ver-r-r-y clever-r-r Scotch stories. Hoot mon,
we'll all dance the Highland Fling, and we
promise ye, ther-r'l be more than a nip in
the air!"

*(SOS)—Scotch over Soda.

V. J. Fawcett

Write for new G-4 Gear Bulletin

**Lufkin FOUNDRY
& MACHINE COMPANY**

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NORTHWEST SALES AND SERVICE
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Dallas Lufkin, Texas New York

PRICELESS PLANT POWER PRODUCT FACTS

... are yours in the new Western Industrial Power Equipment Buyers' Directory, on pages 85-108 of this issue.

It's the only directory published that lists 300 U. S. manufacturers of plant power equipment—electrical, hydraulic, mechanical power transmission, etc., along with the addresses and phone numbers you need to contact branch sales offices, distributors, or representatives nearest you in the 11 Western states.

Keep it handy the year around—it will save you time and money in locating Western sources of sales and engineering help quickly.

For more details, adv. opp. pg., circle No. 44 on Reader Service Postcard
See Directory listing page 97

September 1956 — WESTERN INDUSTRY

Electrical safety

... continued from page 45
a bond is required across all flexible metal conduit. This is to provide adequate continuity of ground. This may be accomplished by installing an additional conductor inside the flex, by brazing the flex into each fitting, or by using suitable terminal fittings which fit inside the flex and necessitate the flexible conduit being cut off square, rather than a diagonal.

Horsepower rated switches have also contributed their share of fail-

ures — usually violent explosions. These failures have often occurred with brand new switches when first operated. Usually there is a "bolted fault." An incorrect connection or ground was made in the original installation, or when a machine or motor was replaced or relocated.

Training reduces human error

The injury causes listed in the "Unsafe acts reported" chart on page 43 of this article certainly indicate a strong need for more thorough training of workers—machine operators,

and maintenance men. A great amount of on-the-job training should be devoted to this element of equipment usage in a thorough electrical equipment safety program. Take a look at a breakdown of the unsafe acts committed by operators and maintenance men involved in the injury reports on which this study was based:

17% of the injuries fully reported were caused by the use of unsafe or defective equipment.

15% involved use of tools in an unsafe manner.

13% involved failure to de-energize equipment before maintenance or repairs were begun.

12% involved assuming an unsafe position.

When switch failures are discussed, the unsafe act on the part of the worker cannot be overlooked. The slipping of a wrench, screw driver, testing equipment, or pliers have each contributed their share in causing switch failure by short circuiting phases or causing a phase to be grounded to the metal enclosure.

Switch maintenance tips

Lack of maintenance often results in a physically or mechanically unsafe condition where switches are involved. This may involve the insulated bar which is connected to the blades of the disconnect switch. These bars often become warped from exposure to heat or moisture. The fastenings may come loose or break, permitting one or more blades to remain in the closed position when the switch is closed. This may cause the motor to attempt to single phase and again failure of the switch may result.

Where loose connections occur at the terminals, heating due to the poor contact may overheat the jaws of the switch and anneal the copper so that all spring tension in the jaws is gone. Loose connections at the terminals may also result from insufficient space at the top and bottom of the switch to permit proper terminations where large sized cable is involved. This overheating may result in failure of the cable insulation and again there is a possibility of property damage or an injury to persons when the equipment is touched.

Many injuries result from attempting to operate a starter or a disconnect switch, each having a horsepower rating smaller than that of the equipment controlled. The Safety Orders require that all starters and disconnecting switches controlling motors must have a horsepower rating at least equal to that of the motor controlled.



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in a
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wirebound"

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nor do intricate articles
perplex Martin Wirebound
engineers. Accurate design for
each job.



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BOX CO.**

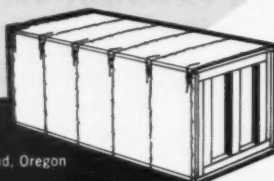
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RB&W FASTENERS - *Strong Point of any assembly*

September 1956 — WESTERN INDUSTRY

... for more details, circle No. 46 on Reader Service Postcard

F. SOMERS PETERSON CO.



Two new technical bulletins have just been published to guide you in the preliminary selection of Elliott flexible shafts for your machines. You'll find Elliott flexible shafts help you cut down on the parts required for power transmission where there are offsets, obstructions or relative motion between power source and driven unit. You'll save assembly time and build a more compact machine.

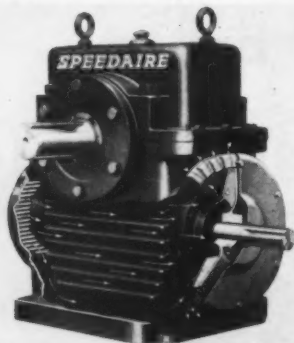
Elliott flexible shaft has earned a reputation for dependability. Write for your copies of Bulletin 247 and 248 today. You'll find it to your advantage to use Elliott flexible shaft for savings and efficiency.

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MANUFACTURING COMPANY
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... for more details, circle No. 47
See Directory listing page 91

SPEEDAIRE WORM GEAR DRIVE

Saves Space, Saves Weight, Saves Money



• This fan-cooled worm gear drive delivers up to double the horsepower of standard worm units of equal frame size. It saves weight, space, money.

Speedaire design moves air at high velocities to increase rate of heat dissipation. This and other modifications give Cleveland's Speedaire worm gear speed reducer a much greater load-carrying capacity. As a result, a Speedaire is capable of doing the job of a much larger conventional unit. Catalog 400 gives detailed design information and typical applications. Write for free copy today.

**CLEVELAND WORM GEAR
Speed Reducers**

... for more details, circle No. 48
See Directory listing page 89

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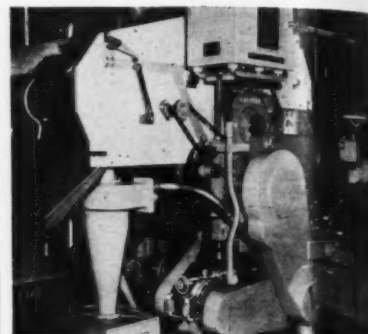
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LOS ANGELES 15

Cleveland Speed Variator

teams up with
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• If your machines require delicate adjustments of speed to vary the rate of work flow, you need the Cleveland Speed Variator.

Pictured here is the famous AccuRay, an electronic control mechanism which is a vital part of the Chesterfield cigarette-making machine. Also vital to the control is the Cleveland Speed Variator through which the AccuRay controls the tobacco feed rate—making speed changes instantly and accurately.

To get better acquainted with the unique features and many advantages of the Cleveland Speed Variator, ask for Bulletin K-200.

**CLEVELAND VARIABLE
Speed Drives**

... for more details, circle No. 49

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**T & C's TELEMETERING
SYSTEM GIVES YOU COMPLETE
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Instantaneous supervision of multiple operations with only two wires. Rugged, compact, economical.

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See Directory listing page 102

20 BEST MANUALS ON MOTOR CONTROLS

—yours for the asking

Obtain your selection by circling item numbers on the WI rip-out postcard, page 109

PRESENTED BELOW are concise reviews of today's best manufacturer technical manuals covering all phases of just one in-plant power subject—electric motor controls.

Each of the thousands of pages in these know-how manuals is packed with valuable data on selection, application, and maintenance of these important links in the chain of equip-

ment between plant power service entry points and actual power utilization points. Collected over the past three months by the editors of **WESTERN INDUSTRY** for special presentation in the annual Plant Power issue, the manuals are made available here, by special permission of the manufacturers, free of charge to key production and plant operation men in the

West's manufacturing and processing plants.

You are invited to check the listings on pages 75-76 and select those manuals that promise to be most helpful with your motor control problems. Circle appropriate key numbers on this month's WI Reader Service Postcard and we will be glad to see that you obtain your selection promptly.

68-page motor control selection manual

A special section of this 68-page book on motor control devices deals with control selection, showing by enclosure, type, and rating the exact components of motor control systems for each horsepower rating, including starters, push buttons, heaters. Other data cover starter modifications, auxiliary interlocks, and renewal parts. Other sections of the book contain photographs, wiring diagrams, and dimensions for motor starters, contactors, relays, switches, push buttons, and pilot devices. Applications and merits of manual and magnetic control and across-the-line and reduced voltage control are compared. (1260A) *General Electric Co.*

... for your copy, circle No. 150

Controls for heating, cooling; pumps, compressors

This 42-page book describes a line of motor controls specifically designed for air conditioning, heating, ventilating, pump, and compressor applications. Specifications and selection tables are included, along with ratings, typical wiring diagrams, and all data needed to select the proper units for the above uses. Manual and magnetic starters are described, as are safety switches, pressure and float switches, relays, push buttons, and complete starting equipment. Price list included. (EC-80A) *Cutler-Hammer, Inc.*

... for your copy, circle No. 151

Eight controls for cab, floor-operated cranes

Eight different controls for cab or floor-operated or dual cab-and-floor operated cranes are covered in this 16-page booklet, which pictures each type and gives detailed information about it. The book covers speed control master switches, a-c. and d-c. magnetic controllers and brakes, main circuit and control circuit type hoist limit stops, resistors for controllers and limit stops, safety disconnect switches, crane protective panels or the magnetic and fusible circuit type, and dynamic braking stop for bridge drives and man trolleys. (Booklet 921) *Electric Controller & Manufacturing Co.*

... for your copy, circle No. 152

Manual on magnetic across-the-line starters

Type RA (right angle) magnetic across-the-line starters are thoroughly detailed in this 12-page manual, which opens with pictures of the five sizes in the line, giving starter unit and enclosure dimensions. The manual continues to discuss type of control and includes wire control diagrams, also covering the selector switch, magnet and coil, control circuit, overload and under-voltage protection. The final section treats different motor starter enclosures. Well illustrated. *Arrow-Hart & Hegeman Electric Co.*

... for your copy, circle No. 153

Selected Westinghouse full voltage line starters

This 16-page manual briefs the most significant controls in Westinghouse's line of full voltage line starters, picturing each and detailing design and construction features. It opens with the basic types of starters, and goes on to include combination units and units of special size, NEMA enclosures, specific purpose control, and modifications. A guide to the firm's class numbers is on the last page. (Bulletin 11-000) *Westinghouse Electric Corp.*

... for your copy, circle No. 154

Reference guide to starters, contactors, switches

This 16-page guide to Clark's motor controls covers a-c. magnetic across-the-line, reduced-voltage, and part winding starters, contactors, a-c. manual starters, push button stations, relays, and limit and master switches. The book is divided into sections covering each item and is indexed on the cover. Complete specifications are given for each control and list price-catalog number charts included in each section. Illustrated. *Clark Controller Co.*

... for your copy, circle No. 155

Adjustable speed drive for d-c. motor

An adjustable speed drive which employs magnetic amplifiers to control the armature voltage of a d-c. motor is explained in this data sheet. Performance specifications are given as well as equipment specifications. A chart of typical speed torque characteristics is included with the general discussion of the unit. (EN 447) A second data sheet includes a case history describing a motor speed control unit which was applied to a conveyor to synchronize it with another conveyor. (Bulletin SY-100) *Vickers, Inc.*

... for your copy, circle No. 156

138-page spiral notebook on general motor controls

Starters, contactors, relays, push buttons, switches—all are included in this general motor controls book which has 138 pages packed with pictures, descriptions, and data in chart form. The first sections on starters include a quick selector chart for general purpose magnetic starters, discussions of regular types, flush mounted, motor mount, explosion proof, direct current, as well as combination magnetic non-reverse starters, reversing magnetic starters, step-type, and multi-speed starters. Other sections cover magnetic relays, pump controls, control panels, push buttons, master and limit switches, drum controllers, foot switches, and pressure and float switches. A table of contents opens the book and an index by style numbers may be found at the end. *Furnas Electric Co.*

... for your copy, circle No. 157

Data on magnetic starters and modification kits

The first of these two brochures is a picture book on magnetic motor starters, showing coil construction, contacts, and circuit. Installation is demonstrated and a motor starter selection chart provided. The second booklet, with 12 pages, explains modification kits for magnet starters in open or NEMA Type 1 enclosures, across-the-line non-reversing, combination non-reversing, and reversing. Pictures, explanations, and ordering information are included for push button and selector-switch kits, auxiliary interlock kits, strongbox coil kits, overload relay kits, and fuse-clip kits. (Bulletins 6198, 6481) *General Electric Co.*

... for your copy, circle No. 158

Starters for control of multi-speed motors

Motor starters (Type H) for 2,200 to 5,000-v. squirrel-cage, wound rotor, synchronous, and multi-speed motors are described in a 12-page brochure, which shows construction of the units and explains exactly how they work. Schematic diagrams are included with dimensions and other specifications. *Allis-Chalmers Manufacturing Co.*

... for your copy, circle No. 159

Specifications for high voltage motor starters

Standard specifications for full and reduced voltage starters for both synchronous and squirrel cage motors are given in this eight-page leaflet on high voltage fused motor starters. Large pictures of the units show their features clearly, while special diagrams are used to point out construction. Both indoor and outdoor weather-proof types are covered. (Bulletin 1041-8) *Nelson Electric Manufacturing Co.*

... for your copy, circle No. 160

Motor starter unit for low voltage switchboard

One section of Mullenbach's book on switchboards and electrical distribution and control equipment covers motor starter units which are designed to be mounted on distribution switchboards. A chart with starter enclosure size, starter size, identification number and height required for various starters is accompanied with ordering data, and much valuable general information on the starter units. *Mullenbach Division, Electric Machinery Manufacturing Co.*

... for your copy, circle No. 161

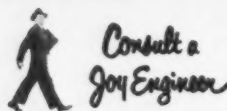


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See Directory listing page 96

76

Engineering data on 7-in. motor control unit

A new 7-in. high motor control unit, one of the smallest production-built plug-in types available, is detailed in this 28-page engineering booklet on control centers. The little unit permits plug-in of as many as 20 NEMA size No. 1 combination motor starters in a standard 90-in. back-to-back section. Construction details of control units and vertical sections are presented in text and illustrations, while components, including motor starters and industrial AB circuit breakers, are described. Engineering data covers dimensions of control units and bus location data. Suggestions are given for floor plans, front-mounted and back-to-back mounting arrangements. Specifications are included. (Bulletin 2-2000) *Federal Pacific Electric Co.*

... for your copy, circle No. 162

Manual, automatic electric motor remote controls

This eight-page booklet opens by explaining what remote motor controls are, how they work, and what they do. With this as background, it then presents the reader with information on the firm's half wave models with 1/50 to 1/2 hp., full wave models with 1/4 to 3 hp., and a few specialty controls (automatic take-up, constant speed winder, and tenter frame feed tension control) for the textile industry. Horsepower, speed range and regulation, power supply and mountings are all covered and each model is pictured. *Electro Devices, Inc.*

... for your copy, circle No. 163

How to control motor drives with a liquid rheostat

How the Type 257 liquid rheostat provides speed control for wound rotor motor drives is explained in an eight-page leaflet, which lists special features of the unit and compares in chart form a motor controlled by a liquid rheostat and one using a step-type control. Construction features are given in detail and the principles of operation explained with a cutaway drawing. Application pictures conclude the booklet, along with specifications. *Allis-Chalmers Manufacturing Co.*

... for your copy, circle No. 164

Complete line of reduced voltage starters

A helpful section of this 12-page booklet on a-c. magnetic reversing and non-reversing reduced voltage starters gives dimensions and scale drawings for eight different starters. Four types are included in the book: primary resistance, auto-transformer, part-winding, and star-delta. Applications for each type are given, along with data on operation, modifications, enclosure, and wiring. Each is pictured also. (Bulletin 11-500) *Westinghouse Electric Co.*

... for your copy, circle No. 165

Manual, magnetic controls for a-c., d-c. motors

A 20-page section of this catalog treats both manual and magnetic a-c. and d-c. motor controls. Many pictures, all showing different types of controls, and concise information are included in the section. Types of controls covered include reduced voltage, secondary resistor, combination, part winding, contactors, and relays. A price list, with items listed by catalog number, comes with the catalog. *Cutler-Hammer, Inc.*

... for your copy, circle No. 166

Data on five manual across-the-line starters

This 12-page booklet on manual across-the-line starters includes sections on five different types: manual and three-position starters without overload protection, toggle and push button starters with thermal overload protection, and a toggle starter with overload protection. For each type descriptions of the mechanism and enclosure is given, along with charts showing which starter to use for different motors. Well illustrated. *Arrow-Hart & Hegeman Electric Co.*

... for your copy, circle No. 167

Starters for wound rotor, synchronous motors

Motor starters for 2,200 through 5,000-v. squirrel cage, wound rotor, and synchronous motors with 50,000-kva. interrupting capacity are treated in these two manuals, with a total of 24 pages. Special features of the units are pointed out in photographs. There are many pictures of the different models and also of their individual parts, as well as those showing applications of the starters. Second booklet lists the features of the air break starter and is also well illustrated. *Electric Controller & Manufacturing Co.*

... for your copy, circle No. 168

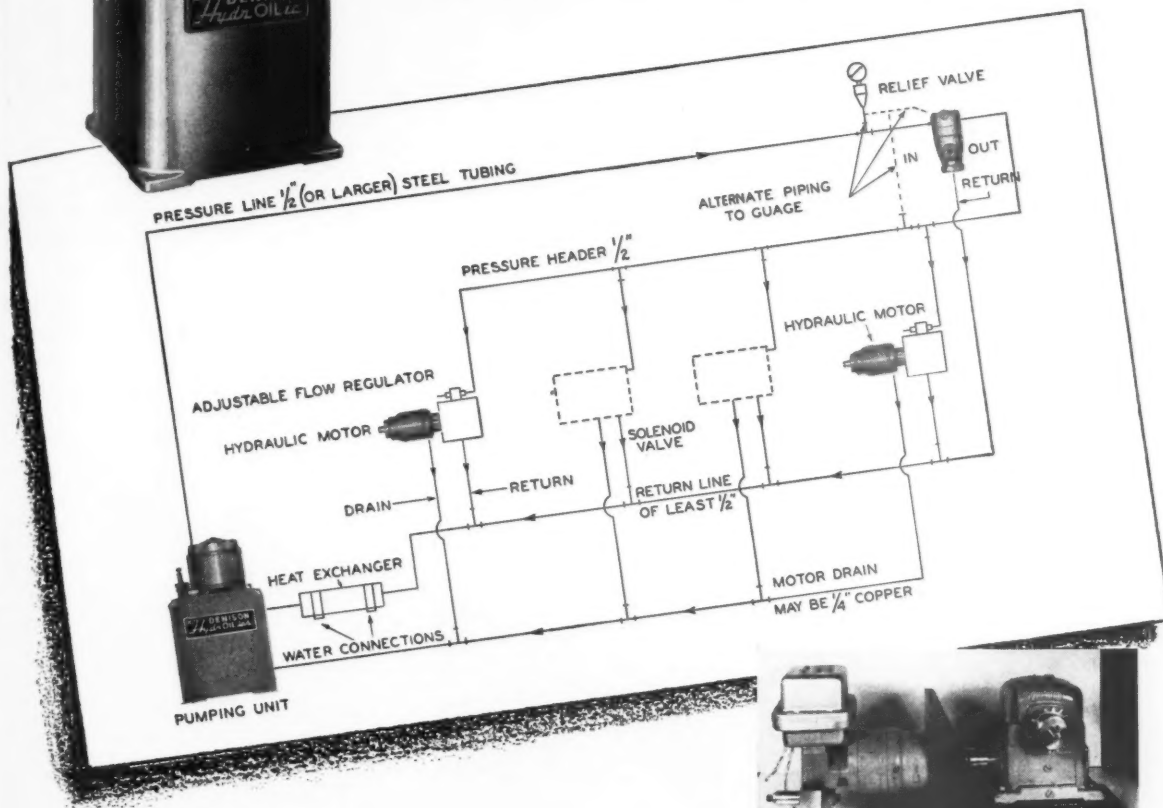
Control centers for NEMA Size 1-5 starter units

Industrial motor control centers for NEMA Size 1 through 5 starter units are discussed from the standpoint of planning, installation, and servicing in this 24-page booklet. Construction and design features are also covered, reference and selection charts provided, and specifications listed. Many large pictures illustrate the centers and their industrial applications. (Bulletin 4979B) *General Electric Co.*

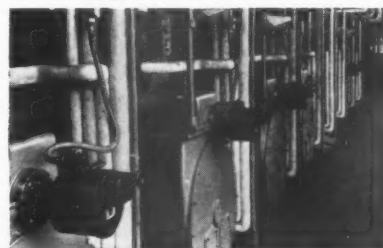
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Four-color printing register controlled within .002 inches with Denison Hydraulic Equipment



Each compensator idler is driven from the sprocket of this gear reducer which is driven by the Denison axial-piston fluid motor. A solenoid valve controls motor operation in response to signals from the compensator amplifier. (Below) Selector switches mounted on the end of each print cylinder shaft generate electrical signals to indicate the angular position of the cylinder.



Did you ever notice how one color overlaps another on the Sunday comic pages?

Getting colors to register properly on high-speed presses is one of the most difficult tasks in modern printing. But the HURLETRON register control system, developed by Electric Eye Equipment Company and powered by Denison hydraulic equipment overcomes the problem . . . actually controls register within .002 of an inch.

Denison hydraulic pumps and motors respond instantly to electronically-developed signals, a major factor in the pinpoint accuracy of Electric Eye's control system. Only one hundredth of a second is required for an adjustment to be made.

The key to the entire system is a Denison fixed displacement, high pressure, high volume vane pump. Denison's fluid axial-piston motor and Multi-Range Flow Control contribute to the highly dependable operation of this printing aid.

Hundreds of similar experiences by equipment manufacturers prove how Denison hydraulic pumps and motors solve difficult control problems with unusual simplicity. Write for full details.

DENISON ENGINEERING DIVISION

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77

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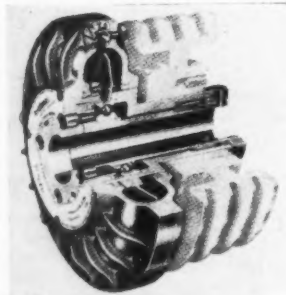
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Complete facilities for the manufacture of all types of Gears and Sprockets as well as general machine work, steel fabrication, welding and flame hardenings. If you need Power Transmission Equipment we have it or make it.

Outstanding Acceptance In Power Transmission Field!



Dodge Flexidyne Drives

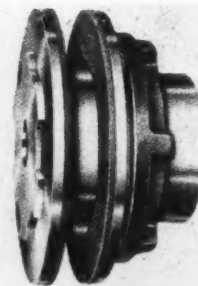
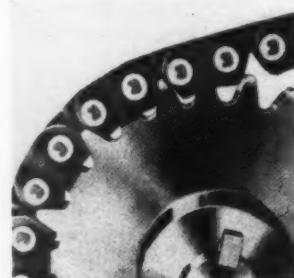
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Morse Hy-Vo Drives

THE NEW WAY

To Harness Large Horsepower Units
To Effectively Transmit High Speeds
To Conserve Weight and Space
To Save on First Cost and Service Life

U.S. Timing Drives

THE NEW WAY

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... for more details, circle No. 52 on Reader Service Postcard
See Directory listing page 98
WESTERN INDUSTRY — September 1956

35 BEST SPEED REDUCER & GEARMOTOR MANUALS

—yours for the asking

Obtain your selection by circling item numbers on the WI rip-out postcard, page 109

KNOW-HOW MANUAL REVIEWS presented below detail the content of today's 35 best volumes of manufacturer data on two gear products for speed reduction by mechanical power transmission—gearmotors and speed reducers.

As pointed out in two articles on selection and application of gear products in this issue (see pages 46 and 60), it takes know-how plus

engineering aids to get the most in economy and performance from gear equipment. Packed into the pages of the manuals reviewed here is a tremendous volume of each.

Collected during the past three months by the editors of **WESTERN INDUSTRY** to complete the package of mechanical power transmission know-how in this Plant Power issue, the manuals are presented here free of

charge by special permission of the manufacturers.

You are invited to check the listings on pages 79-82 and select those manuals that promise to be most helpful with your gearmotor or speed reducer problems. Circle appropriate key numbers on this month's WI Reader Service Postcard and we will be glad to see that you obtain your selection promptly.

Selection tables for transition to new NEMA motors

These two sets of selection tables for Falk's motoreducers, the design of which will accommodate any foot-mounted motor within the capacity of the gear unit, can help solve the problems of transition from old to new NEMA frame motors. A 26-page book on reducers contains selection tables to be used if you need a type of motor not yet developed in the new frame size or if you have a stock of foot-mounted old NEMA frame motors; the new and separate selection tables should be used if you have the new smaller frame NEMA motors. In addition to the tables the booklet gives pointers on selection motoreducers, and dimensions, weights and pictures of the firm's various models. (Bulletin & Table 3100) *Falk Corp.*

... for your copy, circle No. 170

60 pages of data on speed reducers

A 44-page speed reducer engineering manual contains all the necessary technical data for making a choice of speed reducers: horsepower ratings, torque capacity, overhung load values, dimensions, selection data, construction features, and installation and maintenance facts. (Manual B-6727) With it is a more general 16-page descriptive bulletin which has large pictures of different units as well as application photos. There is a section on special speed reducers for unusual speed reduction jobs. (Bulletin 3600) *Westinghouse Electric Corp.*

... for your copy, circle No. 171

Manual on helical gear speed reducer drive unit

This 12-page manual on single and double reduction type speed reducers includes construction features, which are pointed out in a photograph, charts showing overhung loads, recommended lubricants, oil capacity and complete instructions for selecting the proper type and size unit for any application. There is also a guide for determining the character of the load. Dimensions and horsepower capacities, along with installation instructions, complete the book. (Catalog 643) *Stephens-Adamson Manufacturing Co.*

... for your copy, circle No. 172

76 pages on worm gear speed reducers

Worm, helical worm, and double worm gear speed reducers are all covered in these two books. The first opens with illustrations of the speed reducers and a list of some of their advantages. Construction specifications are given along with service classifications and a guide for selecting character of the load. Examples for selecting worm gear speed reducers are given along with ordering data. The book is illustrated and specific sections are devoted to all the different types of worm gear. (Catalog 45-D). The second booklet is devoted to the Type S worm gear speed reducer and information included is similar to the above. (Catalog 45-G) Price list is available. *D. O. James Gear Manufacturing Co.*

... for your copy, circle No. 173

328-page digest with speed reducer section

Dodge's 328-page digest sized engineering manual of power transmission machinery includes a 22-page section on speed reducers. All information pertinent to the firm's torque-arm speed reducers is included: an introduction, a list of special features, how to select the right size, size selection charts, bore dimensions and bushings for speed reducers, and ordering and application information. Seven pages are given to recommended V-belt drives for different reducers. *Dodge Manufacturing Corp.*

... for your copy, circle No. 174

Condensed buying information on G.E. gearmotors

A section of this book on condensed buying information for motors is devoted to gearmotors of the right angle shaft, concentric shaft, dripproof, and totally enclosed types. Buying information includes ratings and prices, dimensions and weights all in chart form. Six motors are pictured and information on where they may be used given. (Bulletin 1027A) *General Electric Co.*

... for your copy, circle No. 175

44-page gearmotor, in-line reducer technical guide

This manual covers the design and selection of standard, utility, and right angle gearmotors and in-line reducers. Several pages are devoted to the features and a presentation of the construction features of each. Service load classifications, horsepower ratings, tables of load characteristics, overhung loads, and torque ratings are all included. Instructions for selecting the different types of units are included also. (Booklet M-560) *Philadelphia Gear Works, Inc.*

... for your copy, circle No. 176

How to select the right gearmotor

Step-by-step instructions for selecting the right gearmotor are given in this 24-page gearmotor and motogear book, beginning with a list of the data necessary for the proper selection. Two sample selection problems are given and solved to show how to use the succeeding load classifications and other selection tables. Brief space is given to overhung load ratings, mountings, backstops, slide rails, and couplings. A new price list is also included. (Book 2447) *Link-Belt Co.*

... for your copy, circle No. 177

Selection information for speed reduction drives

Opening with a list of features of these speed-reduction drives, this 16-page book continues to discuss construction, mounting, lubrication, and backstops of the units. It devotes a page to typical installations and gives very complete selection information. Well illustrated, the book contains charts for torque arm installation and torque arm with overload release. *American Pulley Co.*

... for your copy, circle No. 178

576-page pocket book with reducer, gearmotor sections

This 576-page pocket sized book on power transmission products contains a section of 67 pages on speed reducers and a section of 79 pages on gearmotors. Information on 12 different types of reducers is given; each model is illustrated with a photograph and a front and side scale drawing. Special features are mentioned briefly. Gearmotors are treated in the same manner but an introduction, index, and selection charts open the section. *Boston Gear Works*.

... for your copy, circle No. 179

38-page manual on herringbone speed reducers

This 38-page book on herringbone speed reducers has been prepared as a special aid to engineers, designers, and users of power transmission equipment. Specifications, horsepower ratings, and outline dimensions for six different types of units are included, along with parts designations, assembly diagrams, instructions for selection and explanations of rating tables. Installation and lubrication information concludes the book. (Bulletin 5402) *Western Gear Works*.

... for your copy, circle No. 180

Quick selection guide includes gearmotor data

In this 12-page brochure, called "Handy Guide for Quick Selection of Electric Motors," construction features and available horsepower ratings are listed for Allis-Chalmers' gearmotors. Both the all-motor, which uses standard foot-mounted motor, and the integral type, which uses a round frame, D-flange motor, are described. A second leaflet with six pages shows the features of vari-pitch speed changers, which can be used to reduce speed, and includes arrangement diagrams, a selection table showing recommended unit size for standard motors, and a speed range table of vari-pitch speed changers. *Allis-Chalmers Manufacturing Co.*

... for your copy, circle No. 181

Inside view of a Reliance gearmotor

"Reduce Speed" is an eight-page brochure which gives the reader a good look inside a Reliance gearmotor with a very large cutaway photograph. Construction features are marked in color and discussed on the same page so reference back and forth is easy. The booklet also gives brief information on selecting your gearmotor, motor replacement, and gear replacement. *Reliance Electric & Engineering Co.*

... for your copy, circle No. 182

96-page pocket book on reducer, motor selection

This 96-page pocket sized manual was compiled for engineers, designers, and draftsmen and gives complete technical data necessary for the proper selection of speed reducers and gearmotors. An introductory section covers composition and special features of spur and worm gear reducers, bearings, housings and mountings. A section on speed reducer selection gives horsepower and torque ratings, application examples, and service classifications. Manual is well illustrated with drawings. *Abart Gear & Machine Co.*

... for your copy, circle No. 183

Variable rpm.'s for controlling production tempo

This is the title of a 16-page book on the U. S. Varidrive motor, which will give any rpm. speed within a range of 10:1 and will change speeds while in operation. Large explanatory pictures of the motor are included along with close-ups of various parts, such as the double-ribbed belt, reciprocal diameters, and sliding spline drive. Two pages are devoted to mechanical and electrical controls. (Bulletin 1797) *U. S. Electrical Motors, Inc.*

... for your copy, circle No. 184

48-page speed reducer selection manual

This is a 48-page book designed to make the selection of a speed reducer quick and easy. Seven pages are devoted to telling you just how to do it and covering horsepower-torque ratings, overhung load, worm gearing, different classes of service, and several examples so you can follow the procedure through from start to finish. The balance of the book covers reducers in the firm's line, accompanying each with a dimension drawing and rating chart. (Catalog 1006) *Eberhardt-Denver Co.*

... for your copy, circle No. 185

Electric variable speed drives for lumber industry

A log carriage drive selection chart is a special feature of this six-page booklet on electric variable speed drives for the lumber industry. Pictures and complete information are presented for log carriage drives, and some less detailed information is included for planer and edger feed drives, and plywood lathe drives. Variable speed drives may also be used for conveyors, machine tools, transfer chains, and cable winding machines. *Zidell Machinery & Supply Co.*

... for your copy, circle No. 186

138 pages of technical data on speed reducers

These two books treat right angle gear speed reducers and continuous-tooth herringbone gear speed reducers. The first book on the right angle type has engineering data on spiral bevel gear speed reducers, and herringbone, helical, and planetary gear speed reducers. Selection and ordering are given at the beginning of the book, which is then divided into sections on the different reducers. Sections give construction specifications, sectional views, horsepower ratings, dimensions, and weights, etc. (Catalog 42-B). The second book on herringbone gears includes those with offset and straight line drive, and also gives specifications, rating tables, selection instructions, dimensions, and overhung loads. (Catalog 40-C) *D. O. James Gear Manufacturing Co.*

... for your copy, circle No. 187

12 notebook pages on mounted drives, motorless units

Twelve separate data sheets, designed to be inserted in a notebook for quick reference, make a handy guide to integrally mounted motor drives as well as motorless units. Each picture a unit and gives all pertinent information about it. Included in the series of sheets are several types of gearshift drives, and case histories of gearshift drive applications. A separate six-page booklet points out construction features of the gear-shift drives on a large cutaway photograph and suggests applications for the units also. *Lima Electric Motor Co.*

... for your copy, circle No. 188

Data on motored reducers with "expandable design"

The helical or right angle worm motored reducers covered briefly in a six-page brochure have what Reuland calls "expandable design"; they are supplied in a variety of combinations. The motor winding itself can be supplied in squirrel cage, slip ring, multi-speed motors and also with a fluid coupling. In the brochure arm length, gears, and castings of the reducers are detailed and the unit is pictured. A price list is included with the booklet. (REGF-2000) *Reuland Electric Co.*

... for your copy, circle No. 189

Parts analysis of double helical gears

Opening with a large photograph of a double helical gear, this 12-page booklet continues to analyze the gear part by part starting with gear and pinion, continuing through gear case and bearings to lubrication. Specifications are given along with two pages of dimensions and drawings. Eleven large installation pictures complete the book. (Bulletin 1958E) *Worthington Corp.*

... for your copy, circle No. 190

Listing of Ohio Gear's stock speed reducers

Single and double reduction worm gear and helical gear speed reducers as well as bevel gear style are included in this four-page listing of stock units from Ohio Gear. Horsepower capacities of the units range from $\frac{1}{4}$ to 15 with ratios of 5:1 up to 100:1. Eighteen units are pictured and accompanied with brief paragraphs of information. Final page gives information on four different series. *Ohio Gear Co.*

... for your copy, circle No. 191

Listing of stock fhp. reducer motors

Bodine's complete line of stock fractional horsepower reducer motors of both the spur and worm gear types with ratings up to 219 in. lb. is listed in this 12-page brochure. It contains connection diagrams, pictures, and drawings, and data on windings and performance, dimensions, and horsepower. The firm's special engineering service is briefly mentioned on the final page. (Bulletin 5) *Bodine Electric Co.*

... for your copy, circle No. 192

Introduction to new in-line helical gear drives

Load classes for over 250 applications of these new in-line helical gear drives are contained in chart form in this 16-page booklet, which also discusses construction features and gives instructions on drive selection. Horsepower and torque ratings are included, along with data on dimensions and mountings, backstops, and couplings. Overhung load ratings and minimum sprocket diameters are given. (Book 2651) *Link-Belt Co.*

... for your copy, circle No. 193

Introduction to new Pacific "55" gearmotor

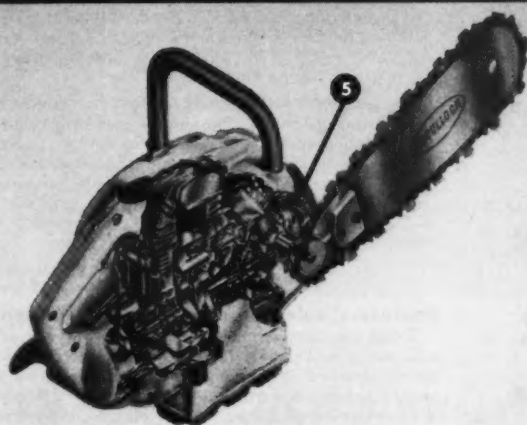
This brochure opens with a parts designation photograph of the Pacific "55" gearmotor, a new motor in the General Electric line. After discussing special features and construction, the booklet presents in picture and caption form how to change output speed and replace motor without disconnecting gear unit. Suggested applications—with cranes and hoists, conveyors, elevators—are listed. (Bulletin 6487) *General Electric Co.*

... for your copy, circle No. 194



Photos, Courtesy of Wayne Manufacturing Co. and McCulloch Motors Corp.

from A to Z in AZUSA



- 1 Elevator sprocket hubs
- 2 Front axle
- 3 Rear axle pivot
- 4 Ring gear spindle
- 5 Gears

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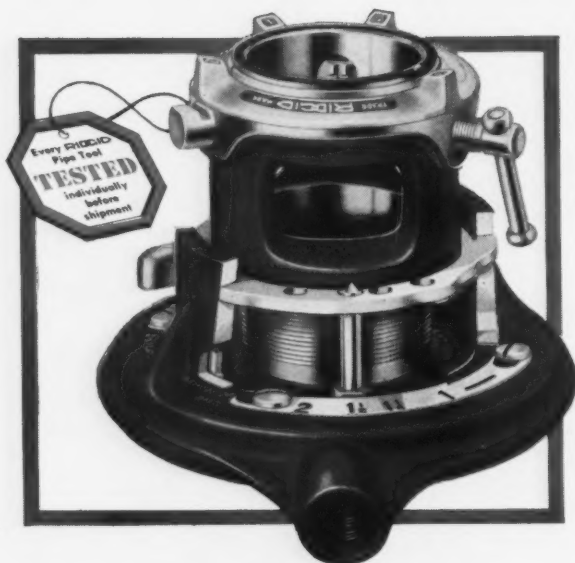


AMFORGE DIVISION

155 N. WACKER DRIVE, CHICAGO 6, ILLINOIS
PLANTS: AZUSA, CALIFORNIA • CHICAGO, ILLINOIS

... for more details, circle No. 53 on Reader Service Postcard

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RIDGID Jam-Proof 65R saves you time, work and mistakes

Ready for work fast—you set 65R to pipe or conduit size in 10 seconds . . . self-contained 1", 1¼", 1½", 2" high-speed steel dies. Self-centering workholder sets to size instantly.

No mistakes—automatic kick-out prevents jamming when standard thread is cut. Workholder setting is mistake-proof.

Beautiful threads—perfectly threaded factory test sample in your new 65R proves it!

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The Ridge Tool Company, Elyria, Ohio, U. S. A.

. . . for more details, circle No. 54 on Reader Service Postcard

48-page manual on right angle speed reducers

Opening with specifications, horsepower ratings, and dimensions for right angle speed reducers, this 48-page designer-engineer handbook also provides parts designation diagrams for six different units. It gives overhung load and thrust capacities, covers cast and fabricated bedplates for the units, service factors, and gives instructions on how to select the reducer. Lubrication facts and a lubrication chart complete the book along with installation instructions. (Bulletin 5503) *Western Gear Works*.

. . . for your copy, circle No. 193

Engineering data for shaft-mounted speed reducers

Complete engineering and selection data for torque-arm, shaft-mounted speed reducers is given in this 28-page booklet, which also discusses the overload release which is designed for use with the speed reducer. Illustrations include cross section views of the reducer and engineering diagrams showing proper positioning for installation. Double and single reduction units, vertical reducers, and flange-mounted types requiring no torque arm for support are all included. Seven pages of tables giving recommended V-belt drives for the different reducers conclude the book. (Bulletin A-637A) *Dodge Manufacturing Corp.*

. . . for your copy, circle No. 196

Engineering manual on Westinghouse gearmotors

A 16-page catalog gives general non-technical information on Westinghouse's gearmotors and includes many illustrations of the different types. Features are listed and the advantages of various mounting positions discussed. (Bulletin 3600) Accompanying the general catalog is an engineering manual with specifications, allowable peak loads, frame sizes, overhung load capacities, dimensions, and installation data. AGMA standard practices are also discussed. (Manual B-6397) *Westinghouse Electric Corp.*

. . . for your copy, circle No. 197

Change-gear reducer designed for conveyor drives

This six-page brochure introduces the change-gear reducer, which was designed specifically for application to conveyor drives. Features discussed include gearing and housing construction, dry well feature, mounting positions, ratios, speed change and torque control. Layout, assembly, and dimension drawings are included, along with a thorough rundown of how the reducer works. One page gives instructions and all necessary data for reducer selection. *Philadelphia Gear Works, Inc.*

. . . for your copy, circle No. 198

Engineers' selection manual for worm gearmotors

Worm gearmotors, made for horizontal or vertical drives with a ratio range from 5.66:1 to 100:1 and from 1/8 to 30 hp., are thoroughly detailed in the engineering and selection manual. Its 68 pages include construction specifications, selection information with examples included, service classifications and character of load, rating and horsepower tables. Also covered are dimensions and weights, different mounting positions, and horsepower and torque formulae. The mounting positions are all diagrammed. (Catalog 46-C) *D. O. James Gear Manufacturing Co.*

. . . for your copy, circle No. 199

Two books on two types of gearmotors

These two books, with a total of 20 pages, list the special features of the Type GD and GW gearmotors made by U. S. Electrical Motors. Books also list horsepower ratings and gear ratios. Cross sectional details of the motors and enlargements of special features are included, along with a discussion of the application of elliptical helical gears and a chart showing degrees of tempering and hardening of gear teeth. Single, double, and triple reduction gearmotors are included, along with a right angle worm gear motor. (Bulletins 1880, 1650) *U. S. Electrical Motors, Inc.*

. . . for your copy, circle No. 140

V-belt selection tables for shaft-mounted drives

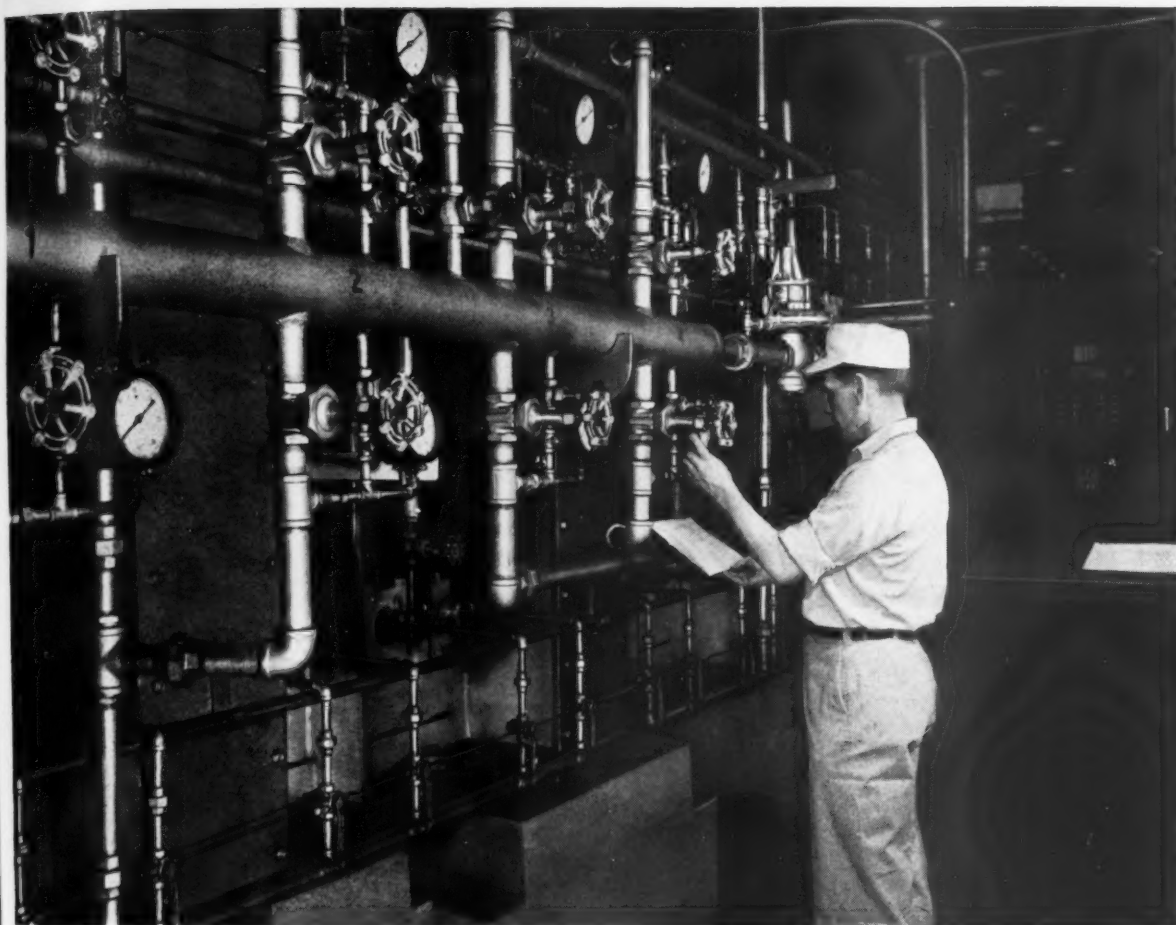
After selecting a steel shaft-mounted drive from an eight-page booklet which pictures the various units and gives instructions for their selection, with selection tables, you can use a second eight-page booklet to choose a V-belt and sheave for the unit. The second booklet is composed entirely of selection tables. (Bulletin 7101, Table 7102) *Falk Corp.*

. . . for your copy, circle No. 141

Pictorial presentation of reducers, ratiomotors

Special features of the 100 series line of ratiomotors, reducers, and flanged reducers made by Boston Gear are presented in an open-out pictorial brochure. Five reducers, four ratiomotors, and four flanged reducers are included with drive charts given for each one. *Boston Gear Works*.

. . . for your copy, circle No. 142



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Machinability can be a critical factor in the economical production of mechanical parts from tubing. This important characteristic of many alloy steels is largely determined by various types of heat-treatment. That's why uniform tubing machinability requires *precise control* of the heating and cooling cycle of the heat treating operation.

John Fencil, a furnace operator, is shown at work on one of the many heat treating furnaces at B&W. By regulating the 128 burners, 22 flues and 145 valves on this specially designed furnace he can completely control the heat treating cycle. Specialized furnaces such as this and trained operators like John assure that B&W alloy mechanical tubing is uniformly heat treated for economical parts production. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-6042M

Seamless and welded tubular products, seamless welding fittings and flanges—in carbon, alloy and stainless steels
... for more details, circle No. 55 on Reader Service Postcard
See Directory listing page 86



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... for more details, circle No. 56 on Reader Service Postcard
WESTERN INDUSTRY — September 1956

INDUSTRIAL POWER EQUIPMENT

Buyers' Directory

a special service feature for the West's plant operating executives

HOW TO USE THIS DIRECTORY

For any product to be purchased or serviced, or about which further details are needed, refer to correct manufacturer's listing in "Where to buy in the West" section to obtain name, address and phone number of nearest sales and engineering office.

If you want more information about a certain type of power equipment for your plant, but names of manufacturers are unknown, refer to correct heading in "Classified Products" section for names of all manufacturers of that item who have sales offices in the West.

Manufacturers of industrial power equipment who are not listed in this directory probably do not have Western branch offices or distributors. If you want more information about manufacturers not listed, write: Editor, WESTERN INDUSTRY, 609 Mission St., San Francisco 5, Calif.

WHERE TO BUY IN THE WEST. . . pages 85-104

Lists plant power equipment manufacturers in the entire U. S. who have Western sales offices, distributors or representatives (on pages with strip along upper edges). Complete buying information is shown with each manufacturer's listing as follows:

- Home office address
- Products manufactured
- Manufacturer's branch offices in the West, their addresses and telephone numbers
- Distributors and representatives in the West, their addresses and telephone numbers

CLASSIFIED PRODUCTS pages 105-108

Contains names of manufacturers cross-referenced under 84 categories of industrial power products (see pages with strip along lower edge).

ACME CHAIN CORP., 420 Dwight St., Holyoke, Mass.

Chains for drives (detachable link, roller, silent transmission).

Representatives

Ariz., Phoenix—Garrett Supply Co., 130 W. Madison St. AL 8-5701
 Ariz., Phoenix—Tractor Parts & Equipment Co., 2906 W. McDowell St.
 Calif., Berkeley—Berkeley Industrial Supply, 1909 Pardee St.
 Calif., Los Angeles—Western Belting & Mechanicals, Inc., 5525 E. Emery St.
 Calif., Oakland—Edward L. Parsons, 600 Sixteenth St. TW 3-1577
 Calif., Pacific Palisades—James P. McConkey, P.O. Box 226, GL 4-4989
 Ore., Portland—Berg Evans Chain Co., 240 S.W. First Ave.
 Wash., Seattle—Berg Evans Transmission Co., 61 Sixth Ave. So.

ADEL PRECISION PRODUCTS, DIV. GENERAL METALS CORP., 10777 Vanowen St., Burbank, Calif. ST 7-2611

Power gear pumps, Manual and solenoid operated directional control valves, Pilot control valves, Volume controls, Check valves, By-pass valves.

Representatives

Ariz., Phoenix—Air-Draulics Co., 31 So. 3rd Ave.
 Calif., Glendale—Haskel Engineering & Supply Co., 1236 So. Central Ave.
 Calif., Millbrae—Haskel Engineering & Supply Co., 305 Adrian Rd.
 Ore., Portland—Russ Chamberlin Co., 234 S.E. 12th Ave.
 Wash., Seattle—Haskel Engineering & Supply Co., 6518 48th Ave. N.E.

ADVANCE GEAR & MACHINE CORP., 5851 Holmes Ave., Los Angeles 1, Calif.

Clutches, increasers (speed), Reducers, speed (bevel gear, helical gear, planetary gear, shaft mounted, spur gear, worm gear)—all designed and manufactured to customers' drawings or specifications only. Gears (bevel, helical, spur, etc), Gears (worm), Sprckets.

AERO-COUPLING CORP., subsidiary of AEROQUIP CORP., 3015 Winona Ave., Burbank, Calif.

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Branch Offices

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 Colo., Denver—P.O. Box 125, Capitol Hill Sta. SP 7-2618

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 Alaska, Fairbanks—B & C Auto Electric, 509 Gaffney Rd. Phone 2266
 Hawaii, Honolulu—Charles W. Carter Co., 825 Keaumoku St.
 Hawaii, Honolulu—Arthur H. deRocher Co., 612 Sheridan St.
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 Calif., San Francisco—458 Brannan St. SU 1-0972
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 Wash., Seattle—2379 Fourth Ave. So. MU 3232

AHLBERG BEARING CO., 3025 W. 47th St., Chicago 32, Ill.

Bearings (ball), Pillow blocks.

Representatives

Calif., Los Angeles—Latham Sales Co. Div., Bearing Sales Co., 2000 So. Olive St. RI 8-0175
 Calif., San Francisco—F. Somers Peterson Co., 157 13th St. MA 1-2255
 Ore., Portland—Northwest Industrial Sales Co., 222 N.W. Tenth Ave.

AIRMATIC VALVE, INC., 7313 Associate Ave., Cleveland 9, Ohio

Cylinders (air, hydraulic), Valves (air power line, hydraulic power line).

Representatives

Ariz., Phoenix—Circle Sales Co., P.O. Box 2626, 1919-21 E. Washington. AL 8-6928, WI 3-4754
 Calif., Glendale—Valley Engineers, P.O. Box 586, 416 N. Glendale Ave. CI 3-4350
 Calif., Oakland—Otrich Co., Grand Ave. at Weldon. TE 2-3781
 Calif., San Francisco—Power-Mac Corp., 467 So. Van Ness Ave. UN 1-1431
 Calif., San Diego—General Industrial Supply Co., 1115 F St. BE 4-6767
 Wash., Seattle—Standard Equipment Sales, 1731 First Ave. So. SE 1955

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Representatives

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Calif., Los Angeles—H. D. Easterbrook, 1264 So. Boyle Ave. AN 9-9421
Calif., San Diego—James A. Setchell Co., Inc., 301 W. G St. BE 3-3981
Calif., San Francisco—Campbell & George Co., 1601 Cortland Ave. MI 8-1236
Colo., Denver—Young Electric & Mfg. Co., 2134 Curtis St. AC 2-4841
N. Mex., Albuquerque—A & A Supply Co., 114 Morningside Dr. N.E. Phone 6-0397
Ore., Portland—Chas. E. Klaus Co., 1094 S.E. Belmont St. BE 2-1185
Utah, Salt Lake City—The Darger Co., 211 So. 2nd West St. EL 5-2873
Wash., Seattle—Chas. E. Klaus Co., 2605 Western Ave. SE 5520

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Calif., San Diego—747 Ninth Ave.
Calif., San Francisco—650 Harrison St.
Colo., Denver—655 Broadway Bldg.
Mont., Butte—81 Hibbard Bldg.
Ore., Portland—620 S.W. 6th Ave.
Utah, Salt Lake City—136 So. Main St.
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Wash., Spokane—West 422 Riverside Ave.

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Calif., San Francisco—1010 Russ Bldg. DO 2-6436
Colo., Denver—1031 15th St. AC 2-4605
Representative
Calif., Oakland—Shields-Harper & Co., 5107 Broadway. OL 3-9119

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Colo., Denver—4800 York St. CH 4-0472
Representatives
Calif., Oakland—Shields-Harper & Co., 5107 Broadway. OL 3-9119
Colo., Denver—Eaton Metal Products, 4800 York St.
Mont., Havre—Valley Motor Supply, 115 1st St.

AMERICAN FLEXIBLE COUPLING DIV., ZURN INDUSTRIES, INC., 1965 Pittsburgh Ave., Erie, Pa.

Clutches (Synchrogear— for marine propulsion drives), Couplings (gear type, flexible).

Representatives

Calif., Huntington Park—N. O. D'Arcy Co., 7535 Marbrisa St. LU 2-5316
Calif., San Francisco—Charles A. Fowler Co., 979 Bryant St. UN 3-5010
Ore., Portland—Bearing Sales & Service, Inc., 1645 N.W. Hoyt St. CA 3-6301
Wash., Seattle—Bearing Sales & Service, Inc., 2908 Sixth Ave. So. MU 0331

AMERICAN PULLEY CO., 4200 Wissahickon Ave., Philadelphia 29, Pa.

Bases (motor), Belting, drive (rubber), Collars (shaft), Pulleys (conveyor, flat belt), Reducers, speed (shaft mounted), Sheaves (adjustable diameter), Transmission, variable speed.

Branch Offices

Calif., Los Angeles—1238 So. Atlantic Blvd. AN 8-6061
Calif., Oakland—800 51st Ave. AN 1-9681, -82
Wash., Seattle—911 Western Ave. MU 0117

Representatives

(Represented by distributors in principal cities)

AMERICAN RUBBER MFG. CO., THE, 1145 Park Ave., Oakland 8, Calif.
Belting, drive (rubber), Hose (air, hydraulic).

Branch Offices

Calif., Los Angeles—1741 W. Slauson Ave. AX 2-0201
Ore., Portland—Dekum Bldg. CA 2-1708
Utah, Midvale—136 E. 7720 South. AM 5-2765
Wash., Seattle—Smith Tower. SE 1727

Representatives

Calif., San Diego—Gould Hardware & Machinery Co., 2212 Main St.
Ore., Medford—Cal-Ore Machinery Co., Inc., 944 So. Central Ave. Phone 3-4507
Ore., Portland—A. W. Davis Supply Co., 2351 N.W. York St.
Utah, Salt Lake City—Kimball Equipment Co., 1846 So. 2nd West St.
Wash., Seattle—Pacific Marine Supply Co., 1223 Western Ave.

AMERICAN STOCK GEAR DIV., PERFECTION GEAR CO., 152nd St. & Vicennes, Harvey, Ill.

Gears (bevel, helical, spur, etc.), Gears (worm), Reducers, speed (worm gear), Sprockets.

Representatives

Calif., Los Angeles—Marwood, Ltd., 320 E. 3rd. MU 3241
Calif., San Francisco—Marwood, Ltd., 357 9th St. HE 1-7893
Ore., Portland—Marwood, Ltd., 209 S.W. 1st Ave. BE 5123
Wash., Seattle—Marwood, Ltd., 1714 1st St. EL 4747

AMPCO METAL, INC., 1756 So. 38th St., Milwaukee 46, Wis.

Bearings (sleeve), Gears (worm), Pumps (corrosion-resistant).

West Coast Plant

Calif., Burbank—30 E. Burbank Blvd. TH 8-5504, VI 9-2391

Representatives

Calif., San Francisco—Allen P. James Co., 430 Ninth St. (Raw Materials)
Colo., Longmont—Slack-Horner Brass Mfg. Co., P.O. Box 838 (Licensee Foundry)

AMPLEX DIV., CHRYSLER CORP., P.O. Box 2718, Detroit 31, Mich.

Bearings (flange, self-lubricating, sleeve, thrust), Cores (self-lubricating), Filters (permanent metal), Finishing machine parts, Gears, Pulleys, Sprockets, Stock (bar, plate, sheet and strip).

Representatives

Calif., Huntington Park—Kingwell Bros., Ltd., 2618 E. 53rd St. LO 5-7428
Calif., San Francisco—Kingwell Bros., Ltd., 457 Minna St., P.O. Box 708. SU 1-0514

ANACONDA WIRE & CABLE CO., 25 Broadway, New York 4, N. Y.

Wire and cable (electric).

See advertisement on page 129

Branch Offices

Calif., Los Angeles—807 Architects Bldg. MA 6-2371
Calif., San Francisco—120 Montgomery St. YU 6-0051, -52, -53
Colo., Denver—909 Seventeenth St. AC 2-0616
Wash., Seattle—953 Stuart Bldg. EL 4686

APPLETON ELECTRIC CO., 1701 Wellington Ave., Chicago 13, Ill.

Circuit breakers, Electric conduits and fittings.

Branch Offices

Calif., Los Angeles—100 No. Santa Fe Ave. MA 5-7711
Calif., San Diego—301 W. "G" St. BE 4-1222
Calif., San Francisco—655 Minna St. MA 1-1584
Colo., Denver—1203 So. Race St. SH 4-0126
Tex., El Paso—8323 Mt. Lantana Dr. (So. New Mex.)
Ore., Portland—2010 N.E. 67th Ave. CA 3-7500
Wash., Seattle—1033 6th Ave. MA 5740

ARO EQUIPMENT CORP., THE, Bryan, Ohio

Air-operated power motors (rotary-vane type), Air-line couplers and connectors.

Branch Office

Calif., Los Angeles—3141 So. Grand Ave.

ASSOCIATED GEAR & MACHINE CO., 829 Santa Fe Ave., Los Angeles 21, Calif. TU 2354

Gear cutting and general machine work, Gear changer for marine and industrial use.

ATLAS CHAIN & MFG. CO., West Pittston, Pa.

Couplings, Roller chain, Sprockets.

Branch Office (for Colo. & Wyo.)

Ill., Chicago—570 W. Randolph St. RA 6-4070
Representatives
Calif., Los Angeles (Maywood)—R. & J. Dick Co., 5276 Atlantic Blvd. LO 8-4014
Calif., San Francisco—R. & J. Dick Co., 18 Bryant St. SU 1-1341
Tex., Dallas—R. C. Brown Co., 5523 Dyer St. EM 7137 (for N. Mex.)
Wash., Seattle—R. & J. Dick Co., 307 Maritime Bldg. MU 1922

AUTOMATIC SWITCH CO., 391 Lakeside Ave., Orange, N. J.

Controls (electromagnetic), Solenoids, Switches (automatic, electric), Valves (air power line, hydraulic power line).

Branch Office

Calif., Los Angeles—923 E. 3rd St. MI 0901
Representatives
Calif., Huntington Park—Valvate Associates, 7814 State St. LO 8-1879
Calif., Los Angeles—Hydraulic Equipment Co., 5924 E. Olympic Blvd. RA 3-1139
Colo., Denver—Clyde P. Elliott, 661 Delaware St. AL 5-7988
Colo., Denver—Hendrie & Bolthoff Co., 1631 17th St. KE 4-4111
Ore., Portland—Harris Supply Co., 524 N.W. 14th Ave. AT 4119-4110
Wash., Seattle—Standard Electric Sales, 1731 1st Ave. So. SE 1955
Wash., Seattle—Steam Supply & Rubber Co., 123 Jackson St. MA 6556

BABCOCK & WILCOX CO., THE, 161 E. 42nd St., New York 17, N. Y.

Boilers and boiler equipment, Burners (oil, gas), Pulverizers (coal), Refractories, Stokers (jet ignition), Tubing (carbon, stainless, alloy steel).

See advertisement on page 83

Representatives

Ariz., Phoenix—C. C. Moore & Co., Lahn Bldg. AL 2-8391
Calif., Los Angeles—C. C. Moore & Co., 1111 Wilshire Blvd. MA 6-6851
Calif., San Francisco—C. C. Moore & Co., 450 Mission St. GA 1-3484
Colo., Denver—Stearns-Roger Mfg. Co., 660 Bannock St. AC 2-8484
Ore., Portland—C. C. Moore & Co., Failing Bldg. CA 8-9684
Utah, Salt Lake City—Stearns-Roger Mfg. Co., 40 Richards St. DA 2-5891
Wash., Seattle—C. C. Moore & Co., Smith Tower. MA 1496

BAILEY METER CO., 1050 Ivanhoe Rd., Cleveland 10, Ohio

Measurement and/or control of combustion, conductivity, draft, flow, liquid level, pressure, pH, speed, smoke density, temperature and vacuum.

Branch Offices

Calif., Los Angeles—816 S. Atlantic Blvd. CU 3-1187
Calif., San Francisco—424 Sharon Bldg. SU 1-0926
Colo., Denver—1506 Kearney St. EA 2-7745
Wash., Seattle—200 Broadway. SE 7192

BALDOR ELECTRIC CO., 4351-67 Duncan Ave., St. Louis 10, Mo.

Motors (electric, DC; poly-phase and single-phase AC).

Representatives

Calif., Los Angeles—Roland S. Boreham Co., 1206 So. Maple. RI 9-3922
Calif., Oakland—Edward L. Parsons Co., 660 16th St. TW 3-1877

BECKMAN, ARNOLD O., INC., 1020 Mission St., South Pasadena, Calif.

RY 1-1161

Oxygen and thermal conductivity analyzers for gas analysis—panel mounted and portable units.

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BELLOWS CO. OF CALIFORNIA, THE, 926 Western Ave., Glendale, Calif. CH 5-6911

Controlled-Air-Power devices, Air compressors (portable, stationary), Cylinders (air, hydraulic), Hose (air), Motors (air), Valves (air power line, hydraulic power line).

BINKS MANUFACTURING CO., 3114-44 W. Carroll Ave., Chicago 12, Ill.

Air compressors, Hose (air), Motors (air), Regulators (pressure).

Branch Offices

Calif., Los Angeles—4915 Pacific Blvd. LU 1-0136

Calif., San Francisco—950 Newhall St. AT 2-4985

Wash., Seattle—514 Denny Way. EL 5131

Representatives

Colo., Denver—R. O. Day, 23 So. Depew Dr. BE 3-5284

Utah, Salt Lake City—Generator Supply Co., 867 So. 2nd E. EM 4-7723

BLAW-KNOX CO., see COPES-VULCAN DIV.

BOGUE ELECTRIC MFG. CO., 52 Iowa Ave., Paterson 3, N. J.

Controls (electric motor), Generators (electric), Motors (electric, DC, variable speed), Panelboards (electric), Rectifiers (silicon), Transmission, variable speed.

Branch Office

Calif., Sherman Oaks—13415 Ventura Blvd. ST 9-2135

BOILER ENGINEERING & SUPPLY CO., INC., Manavon St., Phoenix- ville, Pa.

Boilers.

Representatives

Calif., El Cerrito—American Engineering & Mfg. Co., 11836 San Pablo Ave. LA 5-6291

Calif., Hollywood—Pacific Engineering Equipment Co., 1227 Horn Ave.

Colo., Denver—Champion Specialty Co., 2651 Broadway

Utah, Salt Lake City—Power Engineering Co., 1806 So. State St. Phone 7-6838

BOND CO., CHARLES, 617 Arch St., Philadelphia 6, Pa.

Couplings, Speed reducers, Sprockets, Stock gears.

See advertisement on page 127

Branch Offices

Calif., Los Angeles—1014 W. 75th St.

Wash., Seattle—P. O. Box 1944 Main Post Office

Representatives

Calif., Long Beach—Bay City Bearing Co., 709 W. 16th St.

Calif., Los Angeles—Associated Gear & Machine Co., 829 Santa Fe Ave.

Calif., Maywood—Bay City Bearing Co., 5275 Atlantic Blvd.

Calif., Sacramento—Capital Machine & Welding Works, 83 No. 17th St.

Calif., San Francisco—A. J. Gleisner Co., 975 Bryant St.

Calif., Stockton—Geiger Iron Works, Inc., Scotts Ave. & Pilgrim St.

Wash., Seattle—Chain Gear, Inc., 820-24 First Ave. So.

BOSTON GEAR WORKS, Quincy 71, Mass.

Bearings (ball), Chains for drives (roller), Collars (shaft), Couplings (shaft), Gearmotors, Gears (bevel, helical, spur, etc.), Gears (worm), Hangers (shaft), Pillow blocks, Pulleys, Reducers, speed (helical gear, worm gear), Sprockets, Transmission, variable speed.

Branch Offices

Calif., Los Angeles—1515 N. Kenwood Ave. TH 2-4492

Calif., San Francisco—123 Tenth St. UN 1-6403

Wash., Seattle—1025 84th St. N.E. GI 8521

Representatives

Calif., Los Angeles—Andrews Hardware & Metal Co., 334 S. Main St.

Calif., Los Angeles—Garrett Supply Co., 3844 So. Santa Fe Ave. LU 8-7221

Calif., San Francisco—C. W. Marwedel, 1235 Mission St. UN 1-2125

Calif., San Leandro—Republic Supply Co. of Calif., 1919 Williams St. LO 2-0414 and EN 1-1060

Colo., Denver—Western Belting Co., 1720 Wazee St.

Ore., Portland—J. E. Hazeltine & Co., 115 S.W. Second Ave.

Utah, Salt Lake City—Industrial Supply Co., Inc., 121 Social Hall Ave.

Wash., Seattle—Cragin & Co., 932 First Ave. So.

Wash., Spokane—J. E. Haseltine & Co., No. 1101 Division St.

BROS. WM., BOILER & MFG. CO., 1057 10th Ave. S.E., Minneapolis 14, Minn.

Water tube boilers of shop and field erection types, Spreader stokers with dumping or continuous ash discharge grates.

Representatives

Calif., Los Angeles—Frank M. Beeson, 1511 W. 27th St. RE 9820

Colo., Denver—Conwell-Lucas, 1773 Williams St.

Utah, Salt Lake City—James J. Burke Co., 422 W. Ninth St. EM 3-1001

BROWN, DAVID, INC., 999 Beecher St., San Leandro, Calif. LO 9-7525

Couplings, Gearmotors, Gears, Speed reducers.

See advertisement on page 148

Branch Office

Calif., Los Angeles (Maywood)—6025 Atlantic Blvd. LU 1-6661

Representatives

Ore., Portland—Zidell Machinery & Supply Co., 3121 S.W. Moody St. CA 8-8691

Wash., Seattle—Cascade Machinery Co., 4600 E. Marginal Way. RA 6-8500

BRUNING CO., THE, 601 So. 9th St., Lincoln 1, Neb.

Cylinders (air, hydraulic), Fittings and couplings (air, hydraulic), Hose (hydraulic).

Branch Office

Calif., Burbank—341 So. Orchard Dr. TH 2-2252

Representatives

Calif., Glendale—Haskel Engineering & Supply, 1236 So. Central. CI 4-8148

Calif., Millbrae—Haskel Engineering & Supply, 305 Adrian Rd. OX 7-4046

Ore., Portland—Hydraulic & Air Equipment Co., 2316 N.W. Savier. CA 2-3295

Wash., Seattle—Hydraulic & Air Equipment Co., 2450 6th Ave. So. MU 1681

BRUNNER MANUFACTURING CO., 1821 Broad St., Utica 1, N. Y.

Air compressors, Air conditioners (packaged), Refrigeration compressors, Refrigeration condensing units (open-type and semi-hermetic).

Branch Offices

Calif., Los Angeles—3520 Council St. DU 9-1391

Colo., Denver—3610 Federal Blvd. GR 7-4120

Representatives

Calif., Los Angeles—R. S. Boreham Co., 1206 Maple Ave. RI 9-3922

Calif., San Francisco—R. E. Sanderson & Assoc., 221 11th St.

Colo., Denver—Auto Equipment Co., 14th & Lawrence

Colo., Denver—Foster Auto Supply, 550 Acoma St.

N. Mex., Albuquerque—Motor Equipment Co., 100 Marquette. N.E.

Ore., Portland—J. G. Ward, 212 N.W. 14th Ave.

Utah, Salt Lake City—Service Station Supply Co., 625 So. 2nd St. W.

BUCHANAN ELECTRICAL PRODUCTS CORP., 225 Rt. 22. Hillside, N. J.

Electrical components, connectors and fittings—Terminal blocks (heavy-duty one-piece blocks, AN type strips, sectional heavy-duty pre-SURE-blocks, section medium-duty pre-SURE-blocks), Connectors (solderless connectors and insulators, solderless terminal lugs, solderless connector and lug installations, pre-SURE-tools and crimping dies), Fittings (conduit and box hardware and fittings).

Representatives

Ariz., Phoenix—Kenneth Anderson Co., 422 So. 7th Ave. AL 3-2655

Calif., Los Angeles—Kenneth Anderson Co., 412 Seaton St. MI 8517

BELLOWS—CENTURY

Calif., Oakland—F. M. Nicholas Co., 463 Jean St. HI 4-2498

Calif., San Francisco—F. M. Nicholas Co., 714 Harrison St. YU 2-1964

Colo., Denver—Fred A. Pease, P.O. Box 1666. FR 7-2336

Mont., Billings—Fred A. Pease, P.O. Box 266

Ore., Portland—Keeler, White Co., 322 N.W. Fourth Ave. BR 0593

Utah, Salt Lake City—Fred A. Pease, P.O. Box 1766

Wash., Seattle—Keeler, White Co., 1041 Sixth Ave. So. EL 2367

BULL DOG ELECTRIC PRODUCTS CO., 7610 Jos Campau, Detroit 32, Mich.

Circuit breakers, Ducts (bus), Panelboards (electric), Switches (electric), Switchgear equipment.

Branch Office

Calif., Los Angeles—Bull Dog Electric of Los Angeles, 2885 E. Washington Blvd. AN 9-8101

Representatives

Calif., Oakland—Safety Switchboard Co., 910 89th Ave. LO 9-7001

Colo., Denver—Young Electric & Mfg. Co., 2134 Curtis St. AC 2-4841

Ore., Portland—Coast Electric & Mfg. Co., 1733 N.E. 7th St. AT 8-5373

BUSSMANN MANUFACTURING CO., University at Jefferson, St. Louis 7, Mo.

Fuses.

Branch Offices

Calif., Los Angeles—1004 E. 4th St. MA 5-1954

Calif., San Francisco—2166 Market St. UN 3-2600

Wash., Seattle—95 Connecticut St. MA 0737

C & D BATTERIES, INC., Washington & Cherry Sts., Conshohocken, Pa.

Batteries for the mining industry, for marine service, for control, switchgear, and auxiliary power, for emergency lighting, for industrial and motorized lift trucks, for diesel locomotives, for railroad car lighting and air conditioning, for the communications industry and for fire-alarm systems.

See advertisement on page 140

Branch Office

Ariz., Phoenix—4101 E. Oak St. BR 5-2892

Representatives

Calif., Los Angeles—Fred Pelletier Co., 1014 Venice Blvd. RI 9-5698

Calif., San Francisco—McCormick Morgan Co., 324 Fifth St. SU 1-6591

Colo., Denver—Howard Toneray, 1732 Blake St. CH 4-1102

Ore., Portland—Pacific Battery Co., 427 N.E. Cook St. AT 8-1449

Wash., Seattle—Industrial Products Co., 2911 First Ave. So. MA 7488

Wash., Spokane—Automotive Electric Co., E. 125 Mission St. FA 5379

CALIFORNIA BELTING & LEATHER CO., 1131 So. Main St., Los Angeles 15, Calif. RI 9-1679

Belting (leather, rubber transmission).

CASCADE MANUFACTURING CO., 2201 N.E. 201st Ave., P.O. Box 7587, Portland 20, Ore.

Cylinders (air, hydraulic), Lift truck attachments (hydraulically actuated).

CENTURY ELECTRIC CO., 1806 Pine St., St. Louis 3, Mo.

Gearmotors, Generators (electric), Motors (electric, DC, electric, poly-phase and single-phase AC; variable speed).

Branch Offices

Ariz., Phoenix—625 W. Madison Ave. AL 4-8471

Calif., Los Angeles—1855 Industrial St. TR 8526

Calif., San Francisco—681 Market St., SU 1-2070

Colo., Denver—1644 Blake St. AC 2-3515

Utah, Salt Lake City—1482 Major St. IN 7-5489

Wash., Seattle—607 Third Ave. SE 8443

Wash., Spokane—W. 130 Pacific St. RI 7-0488

CHAIN BELT—CLARK

CHAIN BELT CO., Milwaukee 1, Wis.

(also see **SHAFFER BEARING DIV.**)
Bearings (roller), Chains for drives (detachable link, roller, silent transmission, other), Collars (shaft), Couplings (shaft), Pillow blocks, Pulleys, Sprockets.

Branch Offices

Calif., Berkeley—2940 Seventh St. TH 3-6801
Calif., Los Angeles—7601 Telegraph Rd. RA 3-4751

Ore., Portland—2310 N.W. 24th Ave. CA 3-6121
Wash., Seattle—2425 Airport Way MA 7051

Distributors

Ariz., Phoenix—Garrett Supply Co., P. O. Box 4125
Calif., Bakersfield—Hopper Machine Works, 301 26th St.

Calif., Cloverdale—Klamath Machinery & Locomotive Works of California

Calif., El Centro—W. H. Douthitt Steel & Supply Co., P. O. Box 183—Route 1

Calif., El Centro—Winn Supply Co., 354 E. Main St.

Calif., Eureka—Eureka Boiler Works & Acme Foundry Co., Foot "S" St.

Calif., Fresno—Valley Foundry & Machine Works, 2510 So. East Ave.

Calif., Long Beach—Bay City Bearing Co., 709 W. 16th St.

Calif., Los Angeles—Bearing Sales Co., 1950 So. Olive St.

Calif., Los Angeles—Bethlehem Supply Co. of Calif., P. O. Box 3128 Terminal Annex

Calif., Los Angeles—B. Hayman Co., Inc., 3301 Leonis Blvd.

Calif., Los Angeles—Garrett Supply Co., 3844 So. Santa Fe Ave.

Calif., Los Angeles—Republic Supply Co. of Calif., 2600 So. Eastland Ave.

Calif., Maywood—Bay City Bearing Co., 5275 Atlantic Blvd.

Calif., Oakland—Bay City Iron Works, 4th and Washington Sts.

Calif., Pomona—Reliable Bearing & Supply Co., 246 So. Towne Ave.

Calif., Redding—Gerlinger Steel & Supply, 1527 Sacramento St.

Calif., Sacramento—Capital Machine Welding Works, 83 No. 17th St.

Calif., San Bernardino—Reliable Bearing & Supply Co., 263 So. East St.

Calif., San Diego—Winn Supply Co., 256 7th Ave.

Calif., San Jose—Bearing & Equipment Co., 60 So. San Pedro Way

Calif., San Leandro—Republic Supply Co. of Calif., 1919 Williams St.

Calif., Santa Maria—The Bearing House, P. O. Box 932, Pescadero

Calif., Stockton—Guntert & Zimmerman Sales Div., P. O. Box 1688

Calif., Stockton—H. C. Shaw Co., Inc., 240 So. Aurora

Calif., Taft—Hopper Machine Works

Calif., Ukiah—Klamath Machinery & Locomotive Works of Calif., 720 No. State St.

Calif., Ventura—The Bearing House, 1252 No. Ventura Ave.

Colo., Cripple Creek—Union Supply Co.

Colo., Denver—Union Supply Co., 5460 Colorado Blvd.

Ida., Pocatello—Paul Roberts, 850 So. Main, P. O. Box 1151

Ida., Twin Falls—Paul Roberts, 356 4th Ave., P. O. Box 310

Ida., Wallace—Bitco, Inc.

Mont., Billings—Hall-Perry Machinery Co., 902 Central Ave.

Mont., Butte—Hall-Perry Machinery Co., 812 E. Iron St.

Mont., Great Falls—Hall-Perry Machinery Co., 1116 15th St. No.

Mont., Missoula—Hall-Perry Machinery Co., 127 E. Main St.

N. Mex., Albuquerque—Industrial Supply Co., 1647 No. 2nd St.

N. Mex., Carlsbad—Carlsbad Supply Co., 501 Park Drive, P. O. Box 1042

Ore., Baker—Basche-Sage Hardware Co., 2101 Main St., Box 151

Ore., Coos Bay—A. B. Daly Co., 824 N. Front St., P. O. Box 240

Ore., Eugene—Harmer Mill & Logging Supply Co., 209 Polk St.

Ore., Klamath Falls—Klamath Machinery Co., 445 Spring St., P. O. Box 781

Ore., Le Grande—Basche-Sage Hardware Co.

Ore., Portland—Clyde Equipment Co., 1631 N.M. Thurman St.

Ore., Portland—H. W. Sharp Co., 71 S.W. Oak St.

Ore., Prineville—Prineville Machine & Supply Co., P. O. Box 95

Ore., Roseburg—Industrial Supply Co., 132 So. Stephens

Ore., Salem—Salem Steel & Supply Co., 180 Court St., P. O. Box 746

Utah, Helper—Carbon Transfer & Supply, P. O. Box 180

Utah, Ogden—Mountain States Implement Co.

Wash., Aberdeen—Whitchee Machinery Co.

Wash., Everett—Everett Hardware Co., 2718 Broadway

Wash., Spokane—Bitco, Inc., E. 2928 Trent Ave.

Wash., Tacoma—Gerriah Machinery Co., 1101 East E St.

Wash., Tacoma—W. S. Walter Co., 1722 Pacific Ave.

Wash., Walla Walla—Morrison Supply Co., 217 E. Elder St.

Wash., Yakima—Dodge-Yakima Supply Co., 109 So. Front St.

CHAR-LYNN CO., 2843 26th Ave. So., Minneapolis 6, Minn.

Cylinders, Filters, Oil bath air cleaners, Oil supply tanks, Quick couplers, Power-packs, pumps, valves (all hydraulic), Couplings (flexible drive), Controls (hydraulic), Fittings and couplings (air, hydraulic), Motors (hydraulic).

Branch Office

Colo., Denver—695 So. Garfield St. SP 7-2552

Representatives

Ariz., Phoenix—Air-Draulics Co., 31 So. 3rd Ave. AL 4-4703, AL 2-2303

Calif., Bakersfield—Bakersfield Hydraulic Jack Co., 503 24th St., FA 3-6666

Calif., Compton—Densmore Engineering Co., Inc., 235 E. Greenleaf, NE 6-3959

Calif., Fresno—Central Supply Co., 424 N St. Phone 8-4567

Calif., Los Angeles—Fornaciari Co., 5350 E. Washington Blvd. AN 9-7595

Calif., Oakland—George A. Kushman Co., 2003 E. 14th St. KE 2-0690

Calif., Sacramento—L & G Specialties, 910 D St. HU 1-1772

Calif., San Jose—Power Transmission Engineering Corp., 84 Keyes St. CY 4-8181

Calif., Santa Ana—H. C. Shaw Co., 1302 E. Delhi Rd.

Calif., South Gate—Hydraulic Tool & Equipment Co., 10825 Sessler St. LO 7-2409

Calif., Stockton—H. C. Shaw Co., 240 So. Aurora. HO 6-6751

Colo., Denver—George Brothers, Inc., 973 Broadway

Ida., Caldwell—Mitchell, Lewis & Staver, Bloomquist Ave., P.O. Box 870. Phone 465

Ida., Downey—Morgan's, 75 Main St. Phone 2816

Ida., Idaho Falls—Morgan's, 1155 No. Yellowstone Ave. Phone 3054

Mont., Billings—Midland Implement Co., Inc., 2301 Montana Ave.

N. Mex., Clovis—Dorris Distributing Co., Inc., 1904 Sheldon St.

Ore., Portland—Cascade Supply Co., 208 S.E. Hawthorne Blvd. FI 7474

Ore., Portland—Russ Chamberlin Co., 234 S.E. 12th Ave. EA 7125

Ore., Portland—Mitchell, Lewis & Staver, 801 S.E. Alder St. BE 2-4191

Utah, Salt Lake City—General Implement Distributors, 415 W. 2nd St.

Wash., Seattle—Polson Implement Co., 631 Western Ave. MA 2391

Wash., Seattle—Spencer Aircraft Industries, 8410 Dalles Ave. LA 0911

Wash., Spokane—Calkins Manufacturing Co., No. 1102 Atlantic St. FA 4518

Wash., Spokane—Mitchell, Lewis & Staver, E. 2626 Trent Ave. LA 7842

Wash., Spokane—Polson Implement Co., E. 210 Montgomery St. EM 5515

Wash., Walla Walla—Morrison Supply Co., 217 E. Alder. Phone 4081

Wash., Yakima—Central Chain & Transmission Co., Inc., 709 So. First St. Phone 2-5810, 2-7046

CHICAGO BELTING DIV., CHICAGO-ALLIS MFG. CORP., 113-125 No. Green St., Chicago 7, Ill.

Belting, drive (leather), Belts, V (leather).

Branch Office

Calif., Santa Monica—3002 Fourth St.

Representatives

Calif., Arcata—Munnell & Sherrill, Inc., 1563 G St. Phone 1123

Ore., Eugene—Munnell & Sherrill, Inc., 1450 W 4th St. Phone 4-3287

Ore., Portland—Munnell & Sherrill, Inc., 1163 N.E. 63rd Ave. AT 1-0021

Wash., Seattle—Washington Belting & Rubber Co., 2761 First Ave. So. EL 6650

Wash., Spokane—Nott-Atwater Co., So. 157 Monroe St. MA 4377

Wash., Tacoma—Washington Belting & Rubber Co., 672 E. 11th St. MA 8158

CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.

Air compressors (portable, stationary), Engines (diesel, gas, dual-fuel), Hoses (air), Motors (air).

Branch Offices

Calif., Los Angeles—6935 E. Bandini Blvd. RA 3-8731

Calif., San Francisco—855 Bryant St. HE 1-7928

Ore., Portland—3522 E. Burnside St. BE 2-5442

Utah, Salt Lake City—156 W. Fourth St. EL 5-2985

Wash., Seattle—2901 First Ave. So. MA 3996

Calif., San Francisco—Pacific Equipment Co., 420 Market St. SU 1-8854

Ore., Portland—Woodbury & Co., 133 S.W. Second Ave.

CHIKSAN CO., 330 N. Pomona Ave., Brea, Calif. JA 9-2121

Fittings and couplings (air, hydraulic), Joints (fittings, swivel).

Branch Office

Calif., Oakland—600 16th St. GL 2-4202

Representatives

Ariz., Phoenix—Cone & Wallace Co., 650 W. Vermont. CR 4-1600

Ore., Portland—Henry Kalz Co., 4023 No. Interstate Ave. TR 3558

Utah, Salt Lake City—The Lang Co., 1st So. 2nd West. Phone 3-5831

Wash., Seattle—E. C. Griffin Co., 539 1st Ave. So. EL 4216

CLARK CONTROLLER CO., THE, 1146 E. 152nd St., Cleveland 10, Ohio

Industrial electrical controls, Pushbuttons, Pilot lights, Limit switches, AC and DC motor starters and controllers, Relays and control components, Specially engineered control of all kinds.

District Sales Offices

Calif., Los Angeles—The Clark Controller Co., 4755 E. 49th St. (West Coast plant)

Calif., San Francisco—F. G. Guthrie, 420 Market St.

Colo., Denver—Peterson Co., 4949 Colorado Blvd.

Ore., Portland—Polich & Durkin, 734 N.W. Glisan St.

Utah, Salt Lake City—Clarence W. Silver Co., 550 W. 7th South St.

Wash., Seattle—H. M. Denny Co., 1016 1st Ave. So.

Representatives

Ariz., Phoenix—Reliable Electric Co., 802 W. Jefferson

Calif., Berkeley—West Coast Engine & Equipment, 1077 Eastshore Highway

Calif., Inglewood—Inglewood Wholesale Electric, 923 So. Prairie Ave.

Calif., Los Angeles—Associated Wholesale Electric, 1111 Santee St.

Calif., Los Angeles—Electrical Distributors, 1311 Glendale Blvd.

Calif., Los Angeles—Industrial Wholesale Electric, 805 E. Pico Blvd.

Calif., Los Angeles—Hollywood Wholesale Electric, 6520 Romaine St.

Calif., Los Angeles—National Parts Distributors, 1320 Lake Shore Ave.

Calif., Los Angeles—Thomas W. Simmons, 611 Wilshire Blvd.

Calif., No. Hollywood—Cal State Electric Supply Co., 10711 Chandler Rd.

Calif., Oakland—Pacific Electric Motor Co., 1009 66th Ave.

Calif., Sacramento—Van Alstyne & Son Electric Co., 2512 Broadway

Calif., San Bernardino—Tri County Electrical Wholesale Co., 453 So. 1st St.

Calif., San Bruno—Bergensen Wholesale Electric, 1051 San Mateo St.

Calif., San Diego—Pacific Wholesale Electric Co., 702 State St.

Calif., San Francisco—Buzzell Electric Works, 130 8th St.

Calif., San Francisco—Columbia Electric Manufacturing Co., 275 Steuart St.

Calif., San Francisco—Frazer & Hansen, 301 Clay St.

Calif., San Rafael—North Bay Electric Works, Inc., P.O. Box 30

Colo., Denver—Weaver Electric Co., 1721 Larimer St.

Ida., Boise—Idaho Chain & Sprocket, Inc., 2400 Warm Springs Ave.

Ida., Idaho Falls—Electrical Contractors Supply, 545 W. 20th St.

Ida., Idaho Falls—Rossiter Electric Sales & Service, Airport Road

Ida., Pocatello—Electrical Contractors Supply, 205 So. 3rd Ave.

Nev., Las Vegas—Osborne & Dermody Supply, 1305 So. A St.

Nev., Las Vegas—Western Wholesale Electric, 1305-07 South St.

Nev., Reno—Osborne & Dermody Supply, P.O. Box 2389, 255 Chestnut St.

N. Mex., Albuquerque—Electric Motors Co., 1801 E. Campus Blvd.

N. Mex., Carlsbad—H & E Electric Supply Co., 1036 No. Edward St.

Ore., Eugene—Eoff Electric Co., 65 W. Sixth

Ore., Grants Pass—Electric Motor Works, 1725 Williams Secondary

Ore., Portland—Eoff Electric Co., 509 W. Tenth

Ore., Portland—L. F. Newton, 3825 S.E. 17th

Ore., Portland—Platt Electric Supply, Inc., 1305 N.W. Davis St.
 Ore., Salem—Eoff Electric Co., 156 No. Front St.
 Utah, Orem—Roberts Wholesale Supply Co., State & Center Sts.
 Wash., Aberdeen—Aberdeen Electric Co., Inc., 217 E. Market St.
 Wash., Seattle—Globe Electric Supply Co., 215 Second Ave. So.
 Wash., Tacoma—Demick Electric Supply Co., 2919 Alaska St.

CLAYTON MANUFACTURING CO.,

401 No. Temple City Blvd., El Monte, Calif. CU 3-4131

Generators (steam), Boilers (package).

Representatives
 Ariz., Phoenix—H. M. Craig, 1636 No. 26th Pl. BR 5-1674
 Calif., Fairfax—R. L. Read, 101 San Gabriel Dr. GL 4-2146
 Calif., San Bernardino—G. F. Wheeler, Rt. 1, P.O. Box 331, Phone 9-3250
 Calif., San Gabriel—R. C. Welch, 356 Alhambra Terrace, AT 9-4320
 Colo., Littleton—S. F. Buscarello, 6376 So. Grant Ave. PY 4-3565
 Ore., Oswego—R. V. Cosner, 3250 S.W. Upper Dr. BL 1-2243
 Wash., Seattle—W. P. Currens, P.O. Box 9036, Queen Anne Sta. CA 3770

Distributors
 Calif., Emeryville—Besler Corp., 4053 Harlan St.
 Calif., Escondido—Webb Bros., Inc., 252 W. Grand Ave.
 Calif., Fresno—Service Welding & Boiler Shop, 250 Broadway
 Calif., La Mirada—Madsen Iron Works, 14120 E. Rosecrans Ave.
 Calif., Los Angeles—The American Laundry Machinery Co., E. Fourth St.
 Calif., Los Angeles—Cherry Burrell Corp., 4621 Pacific Blvd.
 Calif., Los Angeles—Garlinghouse Fremont Co., 6046 E. Washington Blvd.
 Calif., Los Angeles—Howard Supply Co., Inc., 5125 Santa Fe Ave.
 Calif., Los Angeles—Oil Well Heating Systems, Inc., National Oil Bldg., 6th & Grand Ave.
 Calif., Los Angeles—Troy Laundry Machinery Co.
 Calif., Oakland—Laundry & Dry Cleaning Equipment Co.
 Calif., Redwood City—Western Power Equipment Corp., 909 Broadway
 Calif., Sacramento—Norris & Atherton, 3922 Broadway
 Calif., San Diego—Standard Iron Supply, Inc., 1821 Harbor Dr.
 Calif., San Francisco—Cherry Burrell Corp., 2675 Folsom St.
 Calif., San Francisco—Laundry & Dry Cleaning Equipment Co., 1142 Mission St.
 Calif., San Francisco—West Coast Laundry Machinery Co., 3246 17th St.
 Calif., South Gate—Hercro Pipe & Supply, 5335 Southern Ave.
 Colo., Colorado Springs—Colorado Springs Supply Co., 121 W. Cucharras
 Colo., Denver—Dairies Service, Inc., 1936 W. 33rd Ave.
 Colo., Denver—Hendrie & Bolthoff Co., 1635 17th St.
 Colo., Denver—Scientific Supply Co., 800 Water St.
 Colo., Denver—Wagner Machine & Mill Supply, Inc., 444 York St.
 Ida., Boise—Engineers Sales & Service, Inc., 410 Capitol Blvd.
 N. Mex., Albuquerque—General Welding & Boiler Works, 410 First St. N.W.
 N. Mex., Albuquerque—Landes, Zachary & Peterson, Inc., 1609 2nd N.W.
 Ore., Portland—Cramer Machinery Co., 1005 S.E. Stark St.
 Ore., Portland—Monroe Food Machinery, Inc., 1600 S.W. Harbor Dr.
 Ore., Portland—A. W. Mortensen Co., 1117 S.E. Morrison
 Ore., Portland—Western Chemicals, Inc., Foot of Gibbs St.
 Wash., Seattle—Monroe Food Machinery, Inc., 1226 First Ave. So.
 Wash., Seattle—Northern Commercial Co., 811 First Ave.

CLEAVER-BROOKS, 326 E. Keefe Ave., Milwaukee 12, Wis.

Boilers and boiler equipment.

Representatives
 Calif., Long Beach—Heat & Power Equipment Co., 2322 Linden Ave. GA 4-8423
 Calif., Los Angeles—Heat & Power Equipment Co., 1700 So. Main St. NE 6-2095
 Calif., San Francisco—R. F. MacDonald Co., 1485 Bayshore Blvd. JU 4-0648

Colo., Denver—McCartney-Denver Co., 1660 11th St. AC 2-4791
 Ore., Portland—A. W. Mortensen Co., 1409 So. Union St. VE 3165
 Utah, Salt Lake City—The Lang Co., 267 W. First St. Phone 3-5831
 Wash., Seattle—Barrett & Yost, 5600 14th Ave. N.W. HE 1351

CLEVELAND FUEL EQUIPMENT CO.,

1111 Brookpark Rd., Cleveland 9, Ohio

Indicating instruments (draft, air, pressure, flue gas temperature, differential, single pointer, multi-pointer), Furnace draft regulators (draft or pressure sensitive, sequence damper controls, non-sequence damper controls), Combustion systems (master controller—fuel and air feed control, proportioning and timing, complete programming), Electric power actuators (hand wheel optional, integral steam or hot water element optional, integral fuel feed timer optional), Air safety switches (draft, pressure, differential, signal light, post-purge, pre-purge), Smoke indicators and controls (alarm type with meter, overfire jet control with time delay), Panelboards and control cabinets (prewired and factory tested, custom engineered), Systems engineering (special controls, engineered for specific requirements).

Representatives
 Ariz., Phoenix—Cone & Wallace, 650 W. Vermont St. CR 4-1600
 Calif., Los Angeles—R. P. Carmien Co., 816 San Fernando Bldg. VA 0025
 Calif., San Francisco—General Combustion Equipment Co., 67 Beale St. EX 7-0440
 Colo., Denver—Automatic Control & Equipment Co., 1925 Blake St. AC 2-9528
 Ore., Portland—W. R. Norte Co., 2225 N.E. Broadway. AT 8-3459
 Utah, Salt Lake City—Power Engineering Co., 1806 So. State St. IN 7-6838
 Wash., Seattle—Control & Steam Equipment Co., Smith Tower. MU 2273

CLEVELAND WORM & GEAR CO.,

3249 E. 80th St., Cleveland 4, Ohio

Drives (variable speed), Gears (worm), Reducers, speed (worm gear), Transmission, variable speed.

See advertisement on page 74

Representatives
 Calif., Los Angeles—Alden Equipment Co., 1449 W. Rosecrans Ave. FA 1-0360
 Calif., San Francisco—F. Somers Peterson Co., 157 13th St. MA 1-2255
 Colo., Denver—J. M. Warner Co., 600 W. 48th Ave. AC 2-2685
 Ore., Portland—Bearing Sales & Service, Inc., 1645 N.W. Hoyt St. CA 3-6301
 Utah, Salt Lake City—Sales Engineering Co., Inc., 526 W. 8th South St. EL 5-1162
 Wash., Seattle—Bearing Sales & Service, Inc., 2908 Sixth Ave. So. MU 0331

CLIPPER BELT LACER CO., 974 Front Ave. N.W., Grand Rapids 2, Mich.

Belt lacing equipment.

Branch Office
 Calif., Oakland—2511 Broadway. TE 2-0348

COLLYER INSULATED WIRE CO.,

INC., 249 Roosevelt Ave., Pawtucket, R. I.

Electric wire cables and cords.
Representatives
 Calif., Los Angeles—Allied Industries, 412 Seaton St. MU 2244
 Calif., San Francisco—The Baxter Co., 101 Kansas St. MA 1-8636
 Ore., Portland—Bruce-Emmett Co., 830 S.E. Alder St. BE 2-8117
 Wash., Seattle—Bruce-Emmett Co., 1016 First Ave. So.

COLUMBIA CABLE & ELECTRIC CORP., 255 Chestnut St., Brooklyn 8, N. Y.

Conduits (flexible steel, liquid tight electrical), Cable (armored, non-metallic sheathed, underground feeder), Hoses (flexible metallic), Tubing (electric, metallic).

Representatives
 Calif., Los Angeles—Frank H. Bran Co., 607 E. 6th St. MI 7663
 Calif., San Francisco—Robert R. Prussia Co., 524 2nd St. EX 2-0554
 Ore., Portland—The Sanderlin Co., 201 S.E. Washington. VE 0121
 Wash., Seattle—The Sanderlin Co., 129 1st Ave. W. AL 0990

CLAYTON—COUNTER

COMBUSTION ENGINEERING, INC.,

200 Madison Ave., New York 16, N. Y.

Boilers (all types), Stokers, mechanical (all types).
Branch Offices
 Calif., Los Angeles—510 W. 6th St. TR 6823
 Calif., San Francisco—155 Sansome St. YU 2-6262
 Wash., Seattle—Skinner Bldg. SE 5218
Representative
 Utah, Salt Lake City—Joy & Cox, Inc., 415 Judge Bldg. Phone 4-5124

COMMERCIAL SHEARING & STAMPING CO., THE, 1775 Logan Ave., Youngstown, Ohio

Controls (hydraulic), Cylinders (hydraulic), Motors (hydraulic), Pumps (hydraulic power), Valves (hydraulic power line).

Branch Office
 Utah, Salt Lake City—P.O. Box 2036. HU 4-4491

CONTINENTAL ELECTRIC CO., INC.,

325 Ferry St., Newark 5, N. J.

Generators (electric), Motors (electric DC, poly-phase AC).

Branch Office
 Calif., Los Angeles—1709 W. 8th St. DU 7-1267

COOK, H. N., BELTING CO., 401 Howard St., San Francisco 5, Calif.

DO 2-6681
 Belting, drive (chain or link), Belting, drive (composition, leather, rubber), Belts (timing), Belts, V (composition, leather, rubber), Chains for drives (detachable link, roller, silent transmission, other), Fittings and couplings (air, hydraulic), Hoses (air, flexible metallic, hydraulic), Lacing (belt), Pulleys, Sheaves, Sprockets.

See advertisement on page 134

COOPER SPLIT ROLLER BEARING CORP., 2021 Milford Dr., Pittsburgh 34, Pa.

Split roller bearings.

Representatives
 Calif., Los Angeles—Pacific Bearings, 1210 So. Hope St.
 Calif., San Francisco—Bearing Engineers, 1547 Mission St. HE 1-1500
 Ore., Portland—J. W. Minder Chain & Gear Co., 307 S.E. Hawthorne St. BE 6-1131
 Wash., Seattle—Bearing Engineering & Supply, 2548 Airport Way at Lander St.
 Wash., Seattle—C. M. Lovsted & Co., Inc., 4000 W. Marginal Way

COPES-VULCAN DIV., BLAW-KNOX CO., 939 W. 26th St., Erie 4, Pa.

Blowers (soot), Boiler feed water regulators, Controls (combustion), Desuperheaters, Governors (pump), Regulators (pressure), Valves (pressure reducing).

Representatives
 Calif., Los Angeles—Gil Moore & Co., 714 W. Olympic Blvd.
 Calif., San Francisco—Gil Moore & Co., 1001 Tennessee St.
 Colo., Denver—Hank Thurston Co., 475 Acoma St.
 N. Mex., Albuquerque—Denver Fire Clay Co., 121 No. 7th St.
 Utah, Salt Lake City—C. H. Spencer & Co., 210 W. 33rd St.
 Wash., Seattle—Pacific Steam Control Co., 4003 Aurora Ave.

CORNELIUS CO., THE, 550 39th Ave. N.E., Minneapolis 21, Minn.

Air compressors (portable).

Representatives
 Calif., Los Angeles—Healthways, 3669 Seventh Ave. RE 3-9107
 Calif., Los Angeles—U.S. Divers Corp., 11201 West Pico Blvd. BR 2-7905

COUNTER & CONTROL CORP., 5212 W. Electric Ave., Milwaukee 19, Wis.

Circuit controlling counters (predetermining counters with instantaneous reset for automatically recycling a variety of single and multi-stage switch functions), Cyclometers, Programometers.

See advertisement on page 142

CRANE—DIEHL

CRANE CO., 836 So. Michigan Ave., Chicago 5, Ill.

Fabricated piping, Fittings, Steam specialties, Valves.

Branch Offices

Ariz., Phoenix—233 So. First Ave.
Ariz., Tucson—35 Toole Ave.
Calif., Fresno—2169 So. Van Ness
Calif., Long Beach—724 W. Anaheim St.
Calif., Los Angeles—321 E. Third St.
Calif., Oakland—346 9th St.
Calif., Sacramento—1227 Front St.
Calif., Salinas—239 E. Alisal St.
Calif., San Bernardino—777 W. Mill St.
Calif., San Diego—1138 India St.
Calif., San Francisco—301 Brannan St.
Calif., San Jose—63 San Jose Ave.
Calif., Santa Ana—919 Poinsettia St.
Colo., Denver—1631 Fifteenth St.
Colo., Grand Junction—601 Pitkin Ave.
Ida., Pocatello—180 Central Main
Mont., Billings—30th St. and First Ave. So.
Mont., Great Falls—No. 2 Third Ave. So.
Nev., Reno—401 E. Fourth St.
N. Mex., Albuquerque—612 First St. N.W.
Ore., Medford—125 W. Fourth St.
Ore., Portland—710 N.W. Fourteenth Ave.
Utah, Ogden—2001 Wall Ave.
Utah, Provo—237 W. 5th North St.
Utah, Salt Lake City—307 W. Second South St.
Wash., Seattle—419 Second Ave. So.
Wash., Spokane—No. 207 Crestline Ave.
Wash., Tacoma—1209 A St.
Wyo., Casper—802 East C St.

CULLMAN WHEEL CO., 1344 Altgeld St., Chicago 14, Ill.

Chains for drives (roller), Couplings (shaft, flexible), Gears (spur), Sprockets.

Branch Office

Calif., Los Angeles—4395 E. Olympic Blvd. AN 9-9435

Representatives

Calif., Fresno—Elliott Manufacturing Co., 1735 Ventura Ave. Phone 3-6236
Calif., Los Angeles—Casey Bearing Co., 1155 So. Hill St. RI 9-5327
Calif., Oakland—George M. Philpott Co., 2928 Poplar St. GL 2-0458
Calif., San Francisco—George M. Philpott Co., 1060 Bryant St. HE 1-5475
Calif., Stockton—Gelger Iron Works, Scott & Union Ave. HO 6-8622
Ore., Portland—George M. Philpott Co., 2353 N.W. 21st Ave. AT 9327

CURTIS MANUFACTURING CO., 1905 Kienlen Ave., St. Louis 20, Mo.

Air compressors (portable, stationary), Cylinders (air).

Representatives

Calif., Berkeley—R. K. McCoy, 3033 San Pablo. AS 3-6726
Calif., Los Angeles—L. L. Meikle, 2844 So. Grand. RI 8-0151
Ore., Portland—Ed Craven, 1018 S.E. Eighth. FI 7469

CUTLER-HAMMER, INC., 315 No. 12th St., Milwaukee 1, Wis.

Circuit breakers, Clutches, Control centers, Controls (electric, electric motor), Panelboards (electric), Regulators (pressure), Switches (automatic, electric).

Branch Offices

Calif., Los Angeles—6431 Bandini Blvd. RA 3-8391
Calif., San Francisco—2130 Third St. HE 1-3855
Colo., Denver—126 W. 5th Ave. SH 4-2495
Utah, Salt Lake City—165 So. 1st W. EM 3-5013
Wash., Seattle—189 8th Ave. So. EL 4032

DAVEY COMPRESSOR CO., 600 Franklin Ave., Kent, Ohio

Air compressors (portable, stationary), Hose (air).

Manufacturers' Agents

Calif., Arcadia—George Clinger, 524 Columbia Rd.
Calif., Oakland—Culver & Colton, 555 5th Ave.

DAYSTROM, INC., see WESTON ELECTRICAL INSTRUMENT CORP.

DAYTON RUBBER CO., THE, 2352 W. Riverview, Dayton, Ohio

Belting (V-type), V-belts, Sheaves, Pulleys.

Branch Office

Calif., Los Angeles—909 E. Slauson Ave., K. L. Harvey, Reg. Mgr.

Representatives
Dayton distributors are found in the yellow pages of your telephone directory under "Belting"

DEGEN, L. P., BELTING CO., 260 Mission St., San Francisco 5, Calif. EX 2-2820

Belting, drive (composition, leather, rubber), Belts, V (composition, leather, rubber), Chains for drives (roller), Clutches, Fittings and couplings (air, hydraulic), Hose (air, flexible metallic, hydraulic), Lacing (belt), Packing (leather, rubber), Sheaves, Sprockets.

DELCO PRODUCTS DIV., GENERAL MOTORS CORP., 329 E. First St., Dayton 1, Ohio

Generators (electric), Motors (electric, poly-phase and single-phase A.C.)

Branch Office

Calif., Los Angeles—1709 W. 8th St. DU 9-1434

DELCO-REMY DIV., GENERAL MOTORS CORP., 2401 Columbus Ave., Anderson, Ind.

Batteries, Generators (electric, automotive), Motors (electric, DC, starting).

Branch Offices

Products sold through United Motors System offices in all major Western locations.

DENISON ENGINEERING CO., THE, 1160 Dublin Rd., Columbus 16, Ohio
Controls, Cylinders, Motors, Pumps, Valves (all hydraulic).

See advertisement on page 77

Branch Office
Calif., Hawthorne—565 No. Prairie Ave. OR 8-6069, OS 5-4463

Representatives

Utah, Salt Lake City—Mason Machine Tool Co., 415 So. Second E. Phone 4-0189
Wash., Seattle—Star Machinery Co., 241 Lander St. EL 0760

DENSMORE ENGINEERING CO., INC., 235 E. Greenleaf St., Compton, Calif. NE 6-1639, NE 1-4339

Cylinders (hydraulic, pneumatic), Fittings and couplings (air, hydraulic), Motors (air, hydraulic, reciprocating), Valves (hydraulic, pneumatic), Special hydraulic components.

Branch Office

Calif., Oakland—2003 E. 14th St., P.O. Box 1557. KE 2-0690

Representatives

Ariz., Tucson—Hydraulic Sales & Service Co., E. 40th St. & So. Alvernon. Phone 7-2755
Calif., Bakersfield—Bakersfield Hydraulic Jack Co., 503 24th St. FA 3-5663
Calif., Bell—The Paul-Munroe Co., 4867 E. Gage. JE 5227
Calif., Fresno—Central Supply Co., 424 M St. Phone 8-4765
Calif., Glendale—Carl J. Kennedy Co., 1105 No. Pacific Ave. CH 5-3145
Calif., Los Angeles—Circle Seal Supply Co., 4863 Telegraph Rd. AN 9-8289
Calif., Los Angeles—Fornaciari Co., 5350 E. Washington Blvd. AN 9-7595
Calif., Oakland—George A. Kushman Co., P.O. Box 1557. KE 2-0690
Calif., Sacramento—L & G Specialties, 910 D St. HU 1-1772
Calif., San Jose—Power Transmission Engineering Corp., 84 Keyes St. CY 4-8181
Calif., South Gate—Hydraulic Tool & Equipment Co., 10825 Sessler St. LO 7-2409
Colo., Denver—E. C. Wild Co., 695 So. Garfield St. SP 7-2852
Ore., Portland—Hydra-Lines, Inc., 1624 S.E. Grand Ave. BE 4-4186
Utah, Salt Lake City—Don Smith Co. of Utah, 3467 Westwood Dr. CR 7-4003
Wash., Seattle—Spencer Aircraft Industries, Inc., 8410 Dalles Ave. LA 0911
Wash., Spokane—Calkins Manufacturing Co., No. 1102 Atlantic St. FA 4518
Wash., Yakima—Central Chain & Transmission Co., Inc., 709 So. First St. Phone 2-5810

DE VILBISS CO., THE, 300 Phillips Ave., Toledo 1, Ohio

Air compressors (portable, stationary), Hose (air), Regulators (pressure).

Branch Offices

Calif., Los Angeles—1420 So. Los Angeles St. RI 8-2191
Calif., Santa Clara—2725 Lafayette St. AX 6-3611

DIAMOND CHAIN CO., INC., 402 Kentucky Ave., Indianapolis 7, Ind.
Chains for drives (detachable link, roller), Couplings (shaft), Sprockets.

See advertisement on page 17

Branch Offices

Calif., Los Angeles—900 Santa Fe Ave. VA 1723
Calif., San Francisco—595 Santa Cruz. DA DA 3-4940

Representatives

Ariz., Phoenix—Semon Bearing & Supply, 325 No. 3rd Ave. AL 8-7566
Ariz., Tucson—Tucson Bearing Co., Inc., 527 No. Stone Ave. Phone 3-3618
Calif., Arcata—Reliable Hardware Co., Inc., 11th & M Sts. VA 2-0378
Calif., Bakersfield—Power Transmission Equipment, 109 Twenty-third. Phone 5-8601
Calif., Fresno—Pacific Mill & Mine Supply, 530 Van Ness Ave. Phone 4-5924
Calif., Los Angeles—Degen Fiege, 1733 E. 15th. RI 3-2281
Calif., Sacramento—Western Industrial Supply Co., 905 G St. GI 2-7264
Calif., San Diego—Kenton Equipment Co., 1895 Main St. BE 9-5171
Calif., San Francisco—Horsford Bros., 944 Folsom St. SU 1-0657
Calif., San Francisco—Monarch Corp. (Supply Div.), 55 New Montgomery. GA 1-7724
Calif., San Leandro—Monarch Corp. (Supply Div.), 2075 Williams. SW 8-0980
Calif., Santa Clara—Monarch Corp. (Supply Div.), 2455 The Alameda. AX 6-1025
Calif., South Gate—Power Transmission Equipment, 4501 Firestone. LO 4-2551
Calif., Stockton—Hickinbotham Bros., Ltd., 536 So. Aurora. HO 6-9541
Colo., Denver—Colorado Bearing Co., 1618 Wazee St. MA 3-1218
Ida., Boise—Idaho Chain & Sprocket, Inc., 2801 Warm Springs. Phone 3-8392
Ida., Pocatello—Pocatello Chain & Sprocket, 2703 Pole Line Rd. Phone 5401
Mont., Billings—Power Transmission Equipment Co., P.O. Box 988. Phone 4-4185
N. Mex., Albuquerque—Harry Cornelius Co., 1510 Second St. N.W. Phone 3-1776
Ore., Eugene—Bearing Sales & Service, Inc., 225 7th Ave. W. DI 5-0325
Ore., Portland—Woodbury & Co., 5851 No. Lagoon. CA 8-6641
Ore., Roseburg—Bearing Sales & Service, Inc., 729 S.E. Stephens St. OR 2-2603
Utah, Salt Lake City—Utah Sprocket & Machine Co., 717 So. 4th W. EL 5-8311
Wash., Everett—Washington Belting & Rubber Co., 2923 Grand Ave. CE 3111
Wash., Longview—Bearing Sales & Service, 748 Commerce Ave. HA 5-1850
Wash., Seattle—Washington Belting & Rubber Co., 2763 First Ave. So. EL 5650
Wash., Tacoma—Washington Belting & Rubber Co., 672 E. 11th St. MA 8158

DICK, R & J CO., INC., P.O. Box 388, Passaic, N. J.

Bearings (hobbited), Belting, drive (chain or link, composition), Belts (timing), Belts, V (rubber), Chains for drives (roller), Collars (shaft), Couplings (shaft), Pulleys, Sheaves, Sprockets, Variable Speed transmission.

See advertisement on page 125

Branch Offices

Calif., Los Angeles—5276 Atlantic Blvd. LU 3-4014
Calif., San Francisco—510 Bryant St. SU 1-1341

Wash., Seattle—911 Western Ave. MU 1922

Representatives
(Contact Los Angeles, San Francisco or Seattle branches for any information.)

DIEHL MANUFACTURING CO., 1209 FINDERNE Ave., Somerville, N. J.

Motors (electric, variable speed).

Representatives

Calif., Los Angeles—Keeler, White Co., 490 Colyton St. MU 6279
Calif., San Francisco—Keeler, White Co., 615 Seventh St. HE 1-2900

Colo., Denver—A. J. Nelson Co., 1639 Blake St. KE 4-6751
Ore., Portland—Keeler, White Co., 322 N.W. 4th Ave. CA 7-0593
Wash., Seattle—Keeler, White Co., 6th Ave. So. EL 2867

DILLON, W. C., & CO., INC., 14620 Keswick St., Van Nuys, Calif. ST 7-8586

Dynamometers (traction type for wire tensioning), Scales (suspension type), Thermometers (dial type, bi-metallic).

DODGE MANUFACTURING CORP., 500 So. Union St., Mishawaka, Ind.

Power transmission machinery (bearings, clutches, couplings, V-belt drives, chain drives, fluid drives, pulleys, speed reducers, sprockets, sheaves), Collars (shaft), Pillow blocks.

See advertisement on page 10

Branch Offices

Calif., Rivera—7744 So. Industry Avenue. RA 3-8621
Calif., San Francisco—55 New Montgomery. DO 2-8434

Representatives

Colo., Denver—Donald Leckey, 1483 So. Eudora. SK 6-5347
Ore., Portland—Marion Studebaker, 2441 N.E. 61st Ave. AT 4-2593

DOERR ELECTRIC CORP., 510 No. Fourth Ave., Cedarburg, Wis.

Electric motors, Variable speed drives.

Representatives

Calif., Alhambra—Cox Sales & Engineering. 1819 W. Valley Blvd. CU 3-2351
Calif., San Francisco—Engineering Sales Co., 55 New Montgomery St. UN 3-1743
Ore., Portland—Charles E. Klaus Co., 1004 S.E. Belmont EA 1189
Wash., Seattle—Charles E. Klaus Co., 2605 Western Ave. SE 5520

DURKEE-ATWOOD CO., 215 7th St. N.E., Minneapolis 13, Minn.

Belting, drive (rubber), Belts, V (composition, rubber), Rubber products (industrial), Sheaves.

Branch Offices

Calif., Los Angeles—5738 Holmes Ave. RI 8-7795
Calif., Oakland—2201 West St. TE 2-3818
Calif., Sacramento—2632 Rochon Way

Representatives

Ariz., Phoenix—Edward D. Maltby Co., 424 W. Jefferson
Calif., Berkeley—Berkeley Industrial Supply, 1003-5 Pardee St.
Calif., Eureka—Bearing Transmission Products, Fifth & B Sts.
Calif., Fresno—Central Supply Co., 424 M St.
Calif., Glendale—Johnson Electric
Calif., Lodi—Gubbershaugh Electric Co., 130 No. Sacramento St.
Calif., Los Angeles—B-B Supply Co., 1207 So. Santa Fe
Calif., Los Angeles—B & T Industrial Supply
Calif., Los Angeles—Degen Fiege Co.
Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St. RI 7-9191
Calif., Los Angeles—Metropolitan Supply Co., 353 E. Second St.
Calif., Los Angeles—Utilities Supply Co., 1736 E. 15th St.
Calif., Maywood—Edward D. Maltby Co., 4035 E. 52nd St. LO 5-5304
Calif., No. Hollywood—Clark's Elec. Mtr. Service, 12736 Sherman Way
Calif., No. Hollywood—General Industrial Tool & Supply, 12517 Sherman Way
Calif., Oakland—Edward R. Bacon Co., 1135 57th
Calif., Oakland—Bearing Engineering Co., 1019 Harrison St.
Calif., Oakland—Cypress Steel & Equipment Co., 1829 Cypress St.
Calif., Oakland—Haulton Champion Co., 320 E. Eighth St.
Calif., Oakland—Otrich Co., 610 16th St.
Calif., Sacramento—Rubber Products Co., 2513 Broadway
Calif., Sacramento—Western Industrial Supply, 905 G St.
Calif., Salinas—Girardi Bearing Service, 267 John St.
Calif., San Diego—Edward D. Maltby Co., 745 15th St.
Calif., San Francisco—Bearing Engineering Co., 1547 Mission St. HE 1-1500
Calif., San Francisco—Bearing Specialty Co., 790 Brannan St. HE 1-4140

Calif., San Francisco—Jay Besore & Assoc., 27 Pine St.

Calif., San Francisco—Ralph Pugh Co., Inc., 530 Howard St.

Calif., San Jose—Bearings & Equipment, 60 So. San Pedro

Calif., Santa Rosa—Santa Rosa Bearing Co.

Calif., Stockton—Bearings & Equipment, 148 E. Miner

Calif., Stockton—Girardi Bearing Co., 148 E. Miner

Colo., Grand Junction—Pacific Western Ind. Supply Co., P.O. Box 118

Nev., Fallon—Motor Supply Co., P.O. Box 712

Nev., Reno—Sanford Tractor Co., No. Valley Road

N. Mex., Albuquerque—Montezuma Bearing Service, 1413 First N.W.

Ore., Portland—Berg Evans Chain Co., 240 S.W. First Ave.

Utah, Salt Lake City—Schieren Jarvis, 320 Dooly Bldg.

Wash., Seattle—Bearing Engr. Supply Co. of Wash., 65 Horton St.

Wash., Seattle—Bearing Engr. Co. of Alaska, 65 Horton St.

Wash., Tacoma—Charles D. West & Co., 3000 So. Prospect St.

DYNAMATIC DIV., EATON MANUFACTURING CO., 3307 14th Ave., Kenosha, Wis.

Adjustable speed eddy-current rotating equipment including: Couplings (air and liquid cooled), Brakes (air and liquid cooled), Drives (Ajusto-Spede, Dynaspede), Dynamometers (absorption, motoring, universal), Amplifier controls (electronic, magnetic), Clutches, Motors (variable speed), Transmission (variable speed).

Representatives

Calif., Pasadena—Shaw Engineering Sales Co., P.O. Box 590. TU 3061
Calif., San Francisco—Engineering Sales Co., 277 Pennsylvania Ave. MA 1-8069
Colo., Denver—G. M. Wallace & Co., 313 Denham Bldg. AM 6-0386
Ore., Portland—Donal Co., P.O. Box 7013. CA 2-4343
Utah, Salt Lake City—G. M. Wallace & Co., Dooly Bldg. Phone 4-9698
Wash., Seattle—Casey Engineering Co., 1736 First Ave. So. MA 4073

EASTMAN PACIFIC CO., 2320 E. 8th, Los Angeles 21, Calif.

Fittings and couplings (air, hydraulic), Hose (air, hydraulic).

Representatives

Ariz., Phoenix—Air-Draulics, 31 So. 3rd Ave. AL 4-4073. AL 2-2303
Calif., San Francisco—C. W. Marwedel, 1235 Mission St. UN 1-2125

EATON MANUFACTURING CO., see DYNAMATIC DIV.

ECONOMY FUSE & MANUFACTURING CO., 2717 N. Greenview Ave., Chicago 14, Ill.

Fuses.

Branch Offices

Calif., Los Angeles—5100 Ambrose Ave. OL 6271
Calif., San Francisco—780 Natoma St. HE 1-4069
Ore., Portland—P.O. Box 766. AT 4-6234
Utah, Salt Lake City—1479 So. Main St. Phone 84-1133
Wash., Seattle—7345 17th Ave. N.E. PL 9908

ELECTRIC CONTROLLER & MFG. CO., see SQUARE D CO., EC&M DIV.

ELECTRIC STORAGE BATTERY CO., THE, 42 So. 15th St., Philadelphia 2, Pa.

Storage batteries for all industrial uses—materials handling, emergency light and power, etc., Switchgear equipment.

Branch Offices

Ariz., Phoenix—Room 204, 210 W. Adams St. AL 4-0851
Calif., Los Angeles—1043 So. Grand Ave. RI 9-4436
Calif., San Francisco—6150 Third St. MI 7-3100
Colo., Denver—234 Commonwealth Bldg. MA 3-7793
Utah, Salt Lake City—P.O. Box 133, Murray Branch. EL 9-5766
Wash., Seattle—1919 Smith Tower Bldg. EL 1377

ELECTRO-DEVICES, INC., 4-6 Godwin Ave., Paterson, N. J.

Variable speed motor control systems.

Representative

Calif., Los Angeles—Minarik Electric Co., 411 Wall St.

ELECTRO SNAP SWITCH & MANUFACTURING CO., 4218-30 W. Lake St., Chicago 39, Ill.

Switches (electric).

Representatives

Calif., San Francisco—Belilove Co., 420 Market St. YU 2-3713
Calif., Sherman Oaks—G. W. Ledbetter Co., 15117 Ventura Blvd. ST 9-8115
Colo., Denver—Fred Pease, P.O. Box 1566. FR 7-2336
Wash., Seattle—G. E. Harris & Co., 444 Dexter Horton Bldg. SE 1673

ELLIOTT MFG. CO., 204 Prospect Ave., Binghamton, N. Y.

Flexible shafting.

See advertisement on page 74

Representative

Calif., San Francisco—F. Somers Peterson, 157 13th St. MA 1-2255

EMERSON MANUFACTURING CO., THE, 9 Osgood St., Lawrence, Mass.

Beater rolls, Controls (compressed air), Couplings (shaft), Engines, Plugs, Separators (magnetic), Suction box covers, Traps (magnetic).

Representatives

Calif., Piedmont—O. E. Larson, 199 Lake Ave. OL 5-2291
Ore., Portland—J. F. Crook, c/o New Heathman Hotel

ENTERPRISE ENGINE & MACHINERY CO., Subsidiary of GENERAL METALS CORP., 18th & Florida Sts., San Francisco 10, Calif. MI 7-0862

Engines, Generators (electric).

Branch Offices

Calif., Burbank—10777 Van Owen. ST 7-2611
Wash., Seattle—2534 Westlake Ave., No. AL 1976

FAIRBANKS, MORSE & CO., 600 So. Michigan Ave., Chicago 5, Ill.

Engines (gas, diesel), Gearmotors, Generators (electric, gasoline, diesel), Motors (electric, DC; electric, poly-phase and single-phase AC; variable speed), Power pumps.

Branch Offices

Calif., Fresno—2379 So. G St. Phone 6-8644
Calif., Los Angeles—4035 So. Soto St. LU 7-8151
Calif., San Francisco—630 Third St. EX 2-5855
Colo., Denver—4995 Colorado Blvd. FR 7-8845
Ore., Portland—105 S.E. Taylor St. BE 2-0131
Utah, Salt Lake City—153 W. 2nd South St. EM 3-2108
Wash., Seattle—668 Lane St. MU 3450

FAMNIR BEARING CO., THE, 37 Booth St., New Britain, Conn.

Bearings (ball).

Branch Offices

Calif., Los Angeles—2276 E. 16th. LU 1-6171
Calif., San Francisco—255 Loomis St. MI 8-3090
Colo., Denver—4425 Vine St. AL 5-1495
Ore., Portland—1202 N.W. 17th Ave. CA 7-0147
Wash., Seattle—605 Spokane St. MA 4141

FAIRCHILD ENGINE & AIRPLANE CORP., SPEED CONTROL DIV., 90 Riberia St., St. Augustine, Fla.

Differential gear boxes, Variable speed drives.

Representatives

Calif., Los Angeles—Wm. C. King, 2200 E. 27th St. LO 8-1781
Calif., San Francisco—Adam Hill Co., 244 Ninth St. MA 1-4137
Ore., Portland—Wm. J. Cottrell & Associates, 4000 S.W. Macadam Ave. AT 7228

FALK — FRANKLIN

FALK CORP., THE, 3081 W. Canal St., Milwaukee 1, Wis.

Couplings (flexible shaft), Castings (steel), Drives (high speed, special gear, shaft mounted, marine propulsion), Gearmotors, Gears (single helical, herringbone), Increasers (speed), Motoreducers, Reducers, speed (bevel gear, helical gear, shaft mounted), Weldments.

Branch Offices

Calif., Los Angeles—220 W. Broadway. CH 5-2381
 Colo., Denver—655 Broadway Bldg. AL 5-8104
Representatives
 Calif., San Francisco—Transmission Engineering Co., 53 Stevenson St. SU 1-4738
 Ore., Portland—Western Machinery Corp., 1035 S.E. 9th Ave. BE 6-4117
 Wash., Seattle—A. T. Harris Co., 1500 Westlake No. AL 8460

FEDERAL PACIFIC ELECTRIC CO., 50 Paris St., Newark 1, N. J.

High and low voltage switchgear, Control and distribution equipment.

Branch Offices

Calif., Los Angeles—3333 San Fernando Rd. CL 7-8261
 Calif., San Francisco—5815 Third St. AT 2-0810
 Ore., Portland—1306 American Bank Bldg. BR 2695
 Wash., Seattle—1415 Elliott Ave. AL 7801
Representatives
 Ariz., Phoenix—Randy Forsyth, P.O. Box 3676. AL 3-0927
 Ida., Boise—M. Swendsen, P.O. Box 156. Phone 4-4971
 Mont., Butte—M & L Supply, 110 E. Front St. Phone 2-2372
 Texas, El Paso—Electrical Engr. & Sales, 2030 Texas St. Phone 3-6130
 Texas, El Paso—F. W. Gorman, Inc., 1701 Texas St. Phone 3-7543
 Utah, Salt Lake City—J. E. Elggren, 428 S.W. Temple
 Utah, Salt Lake City—L. M. Slusser, 318 Dooley Block. EL 5-2322

FEDRAL CORP., 125 Barclay St., New York 7, N. Y.

Trolley busway electrification systems.

Representatives

Calif., Los Angeles—Allied Industries, 412 Seaton St. MU 2244
 Calif., San Francisco—Eichorn & Melchior, 749 Bryant St. DO 2-1038
 Colo., Denver—S & W Electric Co., 2144 Welton St. AC 2-4861
 Wash., Seattle—E. A. Will, 534 First Ave. So. EL 2716

FIELDEN INSTRUMENT DIV., ROBERTSHAW-FULTON CONTROLS CO., 2920 No. Fourth St., Philadelphia 33, Pa.

Controls (compressed air, electric), Instruments (controlling, indicating, measuring, recording, testing).

Branch Office

Calif., Lynwood—3101 Imperial Highway. NE 1-3100

Representatives

Calif., Orinda—Stillson Associates, 33 Meadowpark Ct. CL 4-3751
 Colo., Denver—Automatic Control & Equipment Co., 1925 Blake St. AC 2-9528
 N. Mex., Albuquerque—Steel & Engineering Products Co., 1602 Second St., N.W. Phone 2-7863
 Ore., Portland—Tower Equipment Co., P.O. Box 5766. OL 4-1745
 Utah, Salt Lake City—Midgley-Huber, 44 W. Eighth St. Phone 3-2412
 Wash., Seattle (Mercer Island)—Tower Equipment Co., P.O. Box 158. AD 1460

FISCHER & PORTER CO., 580 Warminster Rd., Hatboro, Pa.

Control centers, Controls (compressed air, electric, electric motor, hydraulic), Instruments, Panelboards, Valves (air power line).

Branch Offices

Calif., Los Angeles—5403 Sheila St. RA 3-6407
 Calif., Oakland—5010 Woodminster Lane. AN 1-5704
 Colo., Denver—Rm. 210, 847 E. Colfax Ave. TA 5-6748
 Utah, Salt Lake City—211 So. Second W. EM 4-6805
 Wash., Seattle—1000 4th Ave. So. MU 4442

FISHER GOVERNOR CO., Marshalltown, Ia.

Regulators (pressure).

Representatives

Ariz., Phoenix—Cone & Wallace Co., 650 W. Vermont Ave. CR 4-1600
 Calif., Los Angeles—Carter-Jones Co., 2334 E. 8th St. TR 1867
 Calif., San Francisco—George R. Friedrich & Co., 725 Tehama St. MA 1-3437
 Colo., Denver—Joy & Cox, Inc., 2124 Broadway. AM 6-0323
 Ore., Portland—R. H. Brown & Co., 5825 N.W. Front Ave. CA 7-1155
 Utah, Salt Lake City—Williams, Gritton & Wilde, 204 Dooley Bldg. Phone 4-6421
 Wash., Seattle—Barrett & Yost, 5600 14th Ave. N.W. HE 1351

FLETCHER ELECTRICAL SPECIALTY CO., 4150 So. Main St., Los Angeles 37, Calif.

Brushes (motor and generator), Carbon products.

Representatives

Calif., San Diego—Bailey Equipment Co., 1604 State St. BE 9-6138
 Calif., San Francisco—Advance Carbon & Electrical Mfg. Co. HE 1-4034

FLEXIBLE STEEL LACING CO., 4607 Lexington St., Chicago 44, Ill.

Belt lacing, Belt lacing and repair equipment

Representatives

(Sold through mill supply distributors, transmission supply houses, and belting manufacturers in all areas of the West.)

FLEXONICS CORP., 1315 So. Third Ave., Maywood, Ill.

Bellows (metallic), Connectors (flexible, pop safety), Expansion joints, Hose (air, flexible metallic, hydraulic), Vibro-sorbers.

Branch Offices

Calif., Hollywood—633 Hollywood Blvd. HO 5-0816
 Calif., San Francisco—1485 Bayshore Blvd. DE 3-0573

Representatives

Calif., San Francisco—Transmission Engineering Co., 53 Stevenson St. SU 1-4738
 Colo., Denver—Thermo Tech Products Co., P.O. Box 4145 So. Denver. SP 7-4417
 Ida., Boise—Richardson Equipment Co., 612 Front St. Phone 3-9431
 Mont., Missoula—W. M. Walterskirchen, P.O. Box 1163. Phone 2-2885
 Ore., Portland—Forsyth-Constant Co., 921 S.W. Oak St. AT 6543
 N. Mex., Albuquerque—Boyd Industrial Engineering Co., 112 W. Granite St. Phone 3-2247
 Utah, Salt Lake City—Capitol City Steel Co., 324 W. 8th So. DA 2-3533
 Wash., Seattle—Arthur Forsyth Co., 2800 15th Ave. W. AL 5717

FLEX-O-TUBE DIV., MERIDAN CORP., 2525 Jim Daly Road, Inkster, Mich.

Flared fittings, JIC tube fittings, SAE brass tube fittings, High and low pressure hose, fittings, and hose assemblies, Teflon hose assemblies, Power steering hose assemblies, Complete hose.

Branch Office

Calif., No. Hollywood—10711 No. Chandler Blvd. SU 3-1863

Representatives

Calif., Long Beach—Barnes & Delaney, 2600 Atlantic
 Calif., Sacramento—Sacramento Rubber Co., 721-723 J St.
 Calif., San Francisco—Monarch Supply Co., 277 Pennsylvania
 Ore., Grants Pass—Cascade Industrial Supply
 Ore., Medford—Hydraulic Jack Service, P.O. Box 1321
 Ore., Roseburg—Roseburg Supply Co., 803 Winchester
 Wash., Spokane—Husen Sales & Engineering Co., 2630 W. Walton Ave.
 Wash., Spokane—Pollard & Co., P.O. Box 193
 Wash., Yakima—Krum Industrial Supply Co., 610 W. A St.

FOOTE BROS. GEAR & MACHINE CORP., 4545 So. Western Blvd., Chicago 9, Ill.

Couplings (shaft), Gearmotors, Gears (bevel, helical, spur, etc.), Gears (worm), Increasers (speed), Reducers, speed (bevel gear, helical gear, planetary gear, shaft mounted, spur gear, worm gear), Power transmission equipment.

Branch Offices

Calif., South Gate—3529 Firestone Blvd. LO 7-5891

Colo., Denver—Hamilton Associates, 1236 Elmer St.

Representatives

Ariz., Phoenix—Edward D. Maltby, Inc., 414 W. Jefferson
 Calif., Long Beach—Edward D. Maltby, Inc., 2041 Anaheim Rd.
 Calif., Los Angeles—Edward D. Maltby, Inc., 1718 So. Flower St. RI 7-9191
 Calif., Maywood—Edward D. Maltby, Inc., 4141 E. 52nd St. LO 5-5304
 Calif., San Diego—Edward D. Maltby, Inc., 1415 15th St.
 Calif., San Francisco—Chas. A. Fowler Co., 979 Bryant St.
 Colo., Denver—Union Supply Co., 5460 Colorado Blvd.
 N. Mex., Carlsbad—Carlsbad Supply Co.
 Ore., Portland—Power Transmission Products, 1107 N.W. 14th Ave.
 Utah, Salt Lake City—National Equipment Co., 101 W. 2nd St. So.
 Wyo., Casper—Union Supply Co.

FORMSPRAG CO., 23601 Hoover Rd., Van Dyke, Mich.

Clutches for overrunning, indexing and backing applications.

Branch Office

Calif., Los Angeles—425 So. Western Ave. DU 2-0500

Distributors

Calif., El Centro—Winn Supply Co., 354 E. Main St. EL 2-6460
 Calif., Fresno—Elliott Manufacturing Co., 1785 Ventura St. Phone 3-6236
 Calif., Long Beach—Bay City Bearing Co., 700 W. 16th St. HE 2-5485
 Calif., Los Angeles—Bearing Sales Co., 1956 So. Olive St. RI 7-0161
 Calif., Maywood—Bay City Bearing Co., 8275 Atlantic Blvd. LO 8-1747
 Calif., Oakland—Bay City Iron Works, 4th & Washington Sts. HI 4-1092
 Calif., Pomona—Reliable Bearing & Supply Co., 246 So. Towne LY 9-5007
 Calif., San Bernardino—Reliable Bearing & Supply Co., 263 So. E St. Phone 8-6565
 Calif., San Diego—Winn Supply Co., 256 Seventh Ave. BE 3-3106
 Ore., Portland—Western Machinery Corp., 1035 S.E. 9th Ave. EM 4117
 Wash., Seattle—The Temco Co., 2405 11th Ave. S.W. EL 5272

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth 1, Tex.

Drives (roller chain, V-belt), Sheaves, Sprockets.

Branch Offices

Calif., Los Angeles—3026 E. Olympic Blvd. AN 3-6128
 Calif., San Francisco—248 Ninth St. UN 3-3037
 Colo., Denver—4975 Jackson St. FL 5-2294

FOSTER WHEELER CORP., 165 Broadway, New York 6, N. Y.

Cooling towers for industrial and central station use, Generating units (steam), Steam condensing equipment.

Branch Offices

Calif., Los Angeles—714 W. Olympic Blvd. RI 7-7839
 Calif., San Francisco—461 Market St. GA 1-6042
 Calif., San Mateo—20 No. San Mateo Dr. DI 2-2061

FOXBORO CO., THE, Foxboro, Mass.

Industrial instruments for the measurement and control of process variables such as conductivity, pressure, flow, temperature and dew point.

Branch Office

Calif., Los Angeles—2807 E. 8th St. TU 8815
 Calif., San Leandro—399 Preda St. LO 2-5525
Representatives
 Colo., Denver—Peterson Co., 4949 Colorado Blvd. DE 3-5434
 Ore., Portland—Burnstead-Woolford, 320 S.W. Stark St. CA 8-6686
 Utah, Salt Lake City—Conely Engineering Co., 165 So. 1st W. St. EM 3-5013
 Wash., Seattle—Burnstead-Woolford, 1411 Fourth Ave. EL 4915

FRANKLIN ELECTRIC CO., INC., 400 E. Spring St., Bluffton, Ind.

Electric motors (fractional, integral, deep well, gear).

Branch Office

Calif., Los Angeles—8255 Beverly. HI 4-3533

FULLER CO. Catasauqua, Pa.

Air compressors (stationary), Bin signals, Compressors (rotary), Feeders, Coolers, Preheaters, Pumps (vacuum).

Branch Offices

Calif., Los Angeles—6225 Wilshire Blvd. WE 3-7126
 Calif., San Francisco—564 Market St. YU 6-5486
 Wash., Seattle—120 Sixth Ave. No. MU 3131
 Representative
 Ariz., Tucson—Central Station Equipment Co., 2323 Aviation Highway. Phone 3-2493

FULTON SYLPHON DIV., ROBERT-SHAW-FULTON CONTROLS CO., P. O. Box 400, Knoxville 1, Tenn.

Internal combustion engine controls, Shaft seals for compressors, fluid drives, aircraft, etc., Pressure regulators, Safety regulators for oil fired boilers, Automatic radiator valves, Pressure gauges.

Branch Office

Calif., Los Angeles—3101 Imperial Highway. NE 6-1400

Representatives

Ariz., Phoenix—John W. Laddow, 630 Broadway. BR 6-2871
 Calif., San Francisco—Norman Brown Co., 765 Minna St. UN 1-0144
 Colo., Denver—Herman & Von Rosenberg, 1051 11th St. AC 2-2833
 N. Mex., Albuquerque—Boyd Engineering Co., 112 W. Granite Ave. Phone 3-2247
 Ore., Portland—Bert Farnes Co., 317 Bldrs. Exchange Bldg., CA 7-1766
 Utah, Salt Lake City—Midgley-Huber Co., 44 W. Eighth South St. Phone 22-2537
 Wash., Seattle—Heating Service Co., 314 Ninth Ave. No. MA 8660
 Wash., Spokane—Frederick Co., W. 915 Mallon Ave. BR 1444

FURNAS ELECTRIC CO., 1043 McKee St., Batavia, Ill.

Controls (electric motor)—magnetic starters, drum controllers, pressure switches, and pilot devices.

Representatives

Ariz., Phoenix—Southwest Sales Co., 1620 E. Earl Dr. CR 4-1331
 Calif., Los Angeles—Ed Warburg Co., 1207 E. 8th St. TR 2981
 Calif., San Francisco—John F. Cady Co., Sales Mart Bldg. JU 5-4108
 Colo., Denver—Clyde P. Elliott, 661 Delaware St. AL 5-7988
 Ore., Portland—Donal Co., P.O. Box 7013. CA 2-4343
 Utah, Salt Lake City—J. Henry Jones Co., 120 Apriquet Ave. Phone 5-4191
 Wash., Seattle—Muth-Richards Co., 1804 Bush Pl. CA 2128

Distributors

Ariz., Phoenix—Daley Electric Co., 1825 E. Jefferson
 Ariz., Phoenix—Hanson's Supply, 2310 W. McDowell
 Ariz., Phoenix—State Equipment & Supply, 416 So. 7th Ave.
 Ariz., Yuma—Daley Electric Co., 17 Second Calif., Burbank—Coast Wholesale Electric Co., 2600 W. Magnolia
 Calif., Inglewood—Inglewood Wholesale Co., 923 Prairie Ave.
 Calif., Los Angeles—Burke Engineering Co., 1204 W. Washington
 Calif., Los Angeles—Main Electric Supply Co., 6790 So. Main St.
 Calif., Los Angeles—Marshall Tool & Supply Co., 2850 E. Olympic
 Calif., No. Hollywood—Cal-State Electric Co., 10711 Chandler Blvd.
 Calif., Richmond—Pioneer Electric Co., 929 Chanslor Ave.
 Calif., Sacramento—Shasta Distributors, 2001 Fulton Ave.
 Calif., San Diego—California Electric Works, 424 8th St.
 Calif., San Francisco—Herning Co., 1178 Folsom St.
 Calif., San Francisco—Phillips & Edwards, 265 Vermont St.
 Calif., San Francisco—Refrigerator & Power Specialties, 380 Brannan St.
 Calif., San Jose—San Jose Armature & Motor, 1002 So. 2nd St.
 Calif., Stockton—Refrigerator & Power Specialties, 1258 No. Union St.
 Colo., Denver—National Parts Distributors, 1075 Galapago St.
 Colo., Denver—Union Supply Co., 5460 Colorado Blvd.
 Hawaii, Honolulu—Jens Schultz & Co., 941 Kawaiaho St.
 Nev., Las Vegas—Hank Electric Motor Service, 13 W. Charleston
 N. Mex., El Paso—Gary Electric, P.O. Box 111
 Ore., Portland—Platt Electric Supply, 1305 N.W. Davis St.

Ore., Portland—Star Machinery Co., 801 S.W. Front St.
 Utah, Richfield—Utah Electric Supply, 50 W. First No.
 Utah, Salt Lake City—Stuart Electric, 13 E. 15th So.
 Wash., Seattle—Palmer Electric Co., 307 Westlake Ave.
 Wash., Seattle—Star Machinery Co., 241 Lander St.
 Wash., Spokane—Star Machinery Co., 415 E. Sprague Ave.
 Wash., Tacoma—Demick Electric Supply, 2919 Alaska St.

G & W ELECTRIC SPECIALTY CO., 7780 Dante Ave., Chicago 19, Ill.

Cable accessories (high voltage), Switchgear equipment.

Representatives

Calif., Los Angeles—R. E. Cunningham & Son, 530 W. Sixth St.
 Calif., San Francisco—C. E. Ingalls & Sons, 541 Monadnock Bldg.
 Colo., Denver—H. C. Guire Co., 715 So. York
 Hawaii, Honolulu—Honolulu Electric Products Co., P.O. Box 459
 N. Mex., Albuquerque—Frank W. Gorman, c/o John Ridenbaugh, P.O. Box 743
 Utah, Salt Lake City—Riter Engineering Co., Kearns Bldg.
 Wash., Seattle—W. R. Hendry Co., Smith Tower Bldg.

GALLAND, F. J., & CO., 544 Market St., San Francisco 4, Calif.

Generators (electric).

Representatives

Calif., Fresno—Inland Equipment Co., Highway 99 at Olive Drive
 Calif., Monterey—Rent-It-All Co., 370 Tyler St.
 Calif., Oakland—United Automotive Service, 24th and Harrison Sts.
 Calif., Santa Barbara—Milpas Rental Service, 6 No. Milpas St.
 Ore., Medford—Equipment Supply Co., 3550 No. Pacific Highway
 Ore., Portland—Applegate Sales Co., 1706 S.E. 122nd
 Ore., Salem—Industrial Supply Co., 544 Ferry St.
 Wash., Seattle—The Bentley Co., 4126 Airport Way

GALLAND-HENNING NOPAK DIV., 2753 South 31st St., Milwaukee 46, Wis.

Cylinders (air and hydraulic, single and double acting), Control valves (air and hydraulic, 3 and 4 way; hand, foot, cam and solenoid operated), Special fluid power devices.

Representatives

Calif., Los Angeles—Willard Engineering Co., 2703 So. Hill St. RI 7-0538
 Calif., San Francisco—Transmission Engineering Co., 53 Stevenson St. SU 1-4738
 Colo., Denver—E. C. Wild Co., 695 So. Garfield St. SP 7-2852
 Hawaii, Honolulu—Chapson Brothers, Ltd., 755 Sheridan St. Phone 9-2274
 Ida., Lewiston—Jameson Machine Supply Co., Phone 3-4517
 Mont., Missoula—Miller Machinery Co., Highway 93 So. P.O. Box 1496. Phone 9-2309
 Ore., Medford—Cal-Ore Machinery Co., 944 So. Central. Phone 2-6155
 Ore., Portland—Caldwell Machinery Co., 738 N.W. Glisan St. CA 8-1564
 Wash., Seattle—E. C. Griffin Co., 539 1st Ave. So. EL 4216
 Wash., Spokane—Western Machinery Co., No. 808 Division St. BR 1826

GATES RUBBER CO., THE, 999 So. Broadway, Denver 17, Colo.

Belts (flat, high speed, variable speed), Belts, V (rubber), Rubber hose (air, steam, hydraulic), Pulleys, Sheaves.

Branch Offices

Calif., Los Angeles—2850 E. 46th St. LU 8-9221
 Calif., San Francisco—242 Shaw Rd. PL 6-3711
 Colo., Denver—999 So. Broadway. SH 4-1911
 Ore., Portland—2551 N.W. 30th Ave. CA 2-9641

Representatives

Calif., Los Angeles—Garrett Supply Co.
 Calif., San Francisco—Darcoid Co. of Calif.
 Colo., Denver—M. L. Foss, Inc.
 Ida., Boise—Western Bearings, Inc.
 Ore., Portland—R. C. Chamberlain Co.
 Wash., Walla Walla—Morrison Supply Co.

GEAR ENGINEERING & MFG. CO., INC., 2826 Norton Ave., Lynwood, Calif. NE 6-2664

Gears (shaft), Gears (bevel, helical, spur, etc.), Gears (worm), Shafts, Splines, Sprockets.

GENERAL CABLE CORP., 420 Lexington Ave., New York 17, N. Y.

Cables (communication, control, lighting, power, welding).

Branch Offices

Calif., Los Angeles—2906 Leonis Blvd.
 Calif., San Francisco—185 Industrial St.
 Colo., Denver—4201 E. 48th Ave.
 Ore., Portland—617 Portland Trust Bldg.
 Wash., Seattle—1137 W. Hanford St.

GENERAL CONTROL CO., INC., 1204 Soldiers Field Rd., Boston 34, Mass.

Control panels, Switches (key, lever, foot, push-button, limit), Timers (electronic, synchronous motor).

Branch Office

Calif., Los Angeles—3757 Wilshire Blvd. DU 8-7585

Representative

Calif., Los Angeles—Federated Purchaser, 11275 W. Olympic Blvd. BR 2-0831

GENERAL CONTROLS CO., 801 Allen Ave., Glendale 1, Calif. VI 9-1483

Controls (automatic pressure, temperature, level and flow—for domestic, industrial and military applications): Actuators, Instruments (indicating, recording, controlling), Solenoid valves, Valves (motor-operated), Thermostats.

Branch Offices

Ariz., Phoenix—108 So. 6th. AL 3-1368
 Calif., San Francisco—600 Bryant St. SU 1-7530
 Colo., Denver—1162 Elati St. CH 4-6776
 Ore., Portland—1620 S.E. Hawthorne Pl. BE 4-9373
 Utah, Salt Lake City—353 W. 4th St. So. EL 5-7611
 Wash., Seattle—767 Broad St. EL 0045

GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y.

Complete line of electric equipment.

Branch Offices

Ariz., Phoenix—220 Luhrs Tower
 Ariz., Tucson—650 No. Sixth Ave.
 Calif., Fresno—407 Patterson Bldg.
 Calif., Los Angeles—212 No. Vignes St.
 Calif., Oakland—409 Thirteenth St.
 Calif., Riverside—3570 Ninth St.
 Calif., Sacramento—626 Forum Bldg.
 Calif., San Diego—1240 Seventh Ave.
 Calif., San Francisco—235 Montgomery St.
 Calif., San Jose—460 Park Ave.
 Calif., Stockton—11 So. San Joaquin St.
 Colo., Denver—650 Seventeenth St.
 Ida., Boise—1524 Idaho St.
 Mont., Billings—303 No. Broadway
 Mont., Butte—103 No. Wyoming St.
 N. Mex., Albuquerque—323 Third St., S.W.
 Ore., Eugene—1170 Pearl St.
 Ore., Medford—107 E. Main St.
 Ore., Portland—920 S.W. Sixth Ave.
 Utah, Salt Lake City—200 So. Main St.
 Wash., Pasco—324 W. Lewis St.
 Wash., Seattle—710 Second Ave.
 Wash., Spokane—So. 162 Post St.
 Wash., Tacoma—1019 Pacific Ave.
 Wash., Wenatchee—328 No. Wenatchee Ave.

GENERAL ELECTRIC CO., CIRCUIT PROTECTIVE DEVICES DEPT., 41 Woodford Ave., Plainville, Conn.

Circuit breakers (molded case), Switches (disconnect, open knife, safety), Panelboard component parts.

Branch Offices

Calif., No. Hollywood—11115 Vanowen St., P.O. Box 470. ST 7-3151, SU 2-0602
 Calif., Oakland—600 16th St. TE 2-0577
 Calif., Sacramento—Builders Exchange Bldg., 1331 T St. GI 3-6960
 Calif., San Francisco—555 Minnesota St. MA 1-1753
 Ore., Portland—48 S.E. Hawthorne Blvd. BE 6-5237
 Wash., Seattle—5000 E. Marginal Way. MO 4800

GENERAL ELECTRIC CO., CONSTRUCTION MATERIALS DIV., 1285 Boston Ave., Bridgeport 2, Conn.

Cables (bus drop, neon sign, street lighting, railway signal, control), Wire (aircraft, appliance, fixture, machine tool, gasoline-resistant, magnetic, remote control).

Branch Offices

Calif., Los Angeles—3000 E. 46th St. LU 2-8211
 Calif., San Francisco—1853 Folsom St. DO 2-3740
 Colo., Englewood—3385 So. Bannock St. SU 1-5707

GENERAL METALS—HEWITT-ROBINS

Ore., Portland—2727 N.W. 29th St. CA 7-7235
Utah, Salt Lake City—200 So. Main St. Phone 4-1891
Wash., Seattle—220 Dawson St. RA 6176

GENERAL METALS CORP., see **ADEL PRECISION PRODUCTS DIV.** and **ENTERPRISE ENGINE & MACHINERY CO.**

GENERAL MOTORS CORP., see **DELCO PRODUCTS DIV.** and **DELCO-REMY DIV.** and **NEW DEPARTURE DIV.**

GERBERG MANUFACTURING CORP., 11800 Milwaukee Ave., Northbrook, Ill.

Couplings (flexible shaft), Motor bases (adjustable), Motor drives (mechanical, variable speed), Pulleys (variable speed), Sheaves (standard and counter-shaft V-groove).

Representatives

Ariz., Phoenix—Southwest Sales Co., 1620 E. Earl Dr.
Ariz., Phoenix—Edward D. Maltby Co., 244 W. Jefferson St.
Calif., Fresno—Commercial Manufacturing & Supply Co., 2432 Railroad Ave.
Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St. RI 7-9191
Calif., Maywood—Edward D. Maltby Co., 4035 E. 52nd St. LO 5-5304
Calif., San Diego—Edward D. Maltby Co., 745 Fifteenth St.
Calif., San Francisco—Monarch Supply Co., 277 Pennsylvania Ave.
Calif., Santa Clara—Monarch Supply Co., 2455 The Alameda
Calif., San Bernardino—Reliable Bearing & Supply Co., 263 So. E St.
Utah, Salt Lake City—Bearing Engineering & Sales Co., 756 So. Second St. W.
Wash., Spokane—Bitco, Inc., E. 2920-28 Trent
Wash., Tacoma—DuCharme Belting & Rubber Co., 501 E. 24th St.
Wash., Walla Walla—Morrison Supply Co., 217-225 E. Alder St.
Wash., Yakima—Dodge Yakima Supply Co., 109 Front St.

GOODALL RUBBER CO., Whitehead Rd., Trenton 4, N. J.

Belting, Hose, Packing, Plastic pipe, Protective coatings, Complete line of mechanical rubber goods.

See advertisement on page 112

Branch Offices

Calif., Los Angeles—2939 E. 11th. AN 3-6723
Calif., San Francisco—221 E. Grand. PL 6-5466
Colo., Denver—1033 Santa Fe. KE 4-8285
Ore., Portland—1111 N.W. 16th Ave. CA 7-1259
Utah, Salt Lake City—651 So. 2nd W. EL 5-7437
Wash., Seattle—2751 Fourth Ave., So. MA 8527
Wash., Spokane—Paulsen Bldg. MA 8131

GOODRICH, B. F., CO., THE, 500 So. Main St., Akron, Ohio

Air hose, Hydraulic control hose (all types industrial hose), Packing, Power transmission belting, V-belts.

Branch Offices

Ariz., Phoenix—200 E. Van Buren St. AL 3-6168
Calif., Los Angeles—3525 Garfield Ave. PA 1-4496
Calif., San Francisco—1950 Army St. AT 2-9620
Colo., Denver—2500 W. 8th Ave. TA 1267
Utah, Salt Lake City—651 W. 6th St. DA 2-2405
Wash., Seattle—1 Hanford St. MU 4300

Distributors

Calif., El Centro—W. H. Douthitt Co.
Calif., Los Angeles—C. R. Davis Co., 422 E. 3rd St.
Calif., Los Angeles—Howard Supply Co., 5125 Santa Fe Ave.
Calif., Sacramento—Sacramento Rubber Co.
Calif., San Diego—Southern Equipment & Supply Co., 2025 E. Harbor Drive
Calif., San Francisco—Hercules Equipment & Rubber Co., 455 Brannan St.
Calif., Santa Maria—The Bearing House
Calif., Stockton—Delta Rubber & Supply Co.
Colo., Denver—A. J. Philpott Co., 1816 California. AL 5-0550
Nev., Las Vegas—Inland Service & Supply Co., 300 W. Wyoming St.

Nev., Reno—Sierra Machinery Co.
Ore., Portland—Empire Rubber & Supply Co., 1720 N.W. Marshall St.
Ore., Portland—General Rubber & Supply, 101 S.W. First Ave. AT 6565
Ore., Salem—Mill Supply Corp., 330 So. Church, Phone 2-5959
Utah, Salt Lake City—Salt Lake Hardware Co., 105 No. Third West St. Phone 3-5771
Wash., Seattle—Nebur Supply Co., 3000 Western. MA 6292
Wash., Spokane—Coatings, Inc., N. 218-220 Browne. Phone MA 5158
Wash., Tacoma—Industrial Rubber & Supply, 301 Puyallup Ave. BR 3244

GOULD-NATIONAL BATTERIES, INC., E. 1201 First National Bank Bldg., St. Paul 1, Minn.

Batteries.

Branch Offices

Calif., Los Angeles—2678 Lacy St.
Calif., Oakland—1000 42nd St.
Colo., Denver—2315 15th St.
Ore., Portland—1973 N.W. Lovejoy St.
Utah, Salt Lake City—415 So. 2nd East

GRATON & KNIGHT CO., 356 Franklin St., Worcester 4, Mass.

Belting (leather, flat, round, V), Belting accessories (lacing, cement, dressing, etc.), Couplings (shaft, flexible), Packings (leather, mechanical).

Branch Office

Calif., San Francisco—1219 Folsom St. MA 1-8429

Representatives

Calif., Fresno—Pacific Mill & Mine, 530 Van Ness Ave.
Calif., Sacramento—Sacramento Rubber Co., 721-23 J St.
Calif., San Francisco—Honolulu Iron Works, 215 Market St.
Ore., Portland—Harris Supply Co., 524 N.W. 14th Ave.
Wash., Spokane—Washington Machinery & Supply Co., 9 W. Cataldo Ave.

GREENE, TWEED & CO., North Wales, Pa.

Compounds (sealing), Couplings (round belt), Hammers (soft-faced), Packings (self-lubricating, molded, sheet), Wrenches (reversible).

Representatives

Ore., Portland—Howard C. Josephson, 1946 N.W. Thurman St. CA 3-5534
Wash., Seattle—T. T. Watson Co., 508 Fifth Ave. So., SE 5279

Distributors

Calif., Fresno—Pacific Mill & Mine Supply Co., Inc.
Calif., Los Angeles—Warren & Bailey Co.
Calif., San Diego—Nuttall-Styris Co.
Calif., San Francisco—H. N. Cook Belting Co.
Calif., San Pedro—C. J. Hendry Co.
Colo., Denver—M. L. Foss, Inc.
Colo., Denver—Hendrie & Bolthoff Co.
Hawaii, Honolulu—C. M. Lovsted & Co.
Ore., Portland—Harris Supply Co.
Ore., Portland—Wall-Western, Inc.
Utah, Salt Lake City—Mountain States Rubber Co., Inc.
Wash., Seattle—Steam Supply & Rubber Co.

GROVER SMITH MANUFACTURING CORP., 850 E. Valley Blvd., San Gabriel, Calif.

Air powered industrial and automotive equipment and related items.

Branch Office

Calif., San Gabriel—848 E. Valley Blvd. AT 9-5284

Representatives

Ariz., Phoenix—Gresco, Inc.
Calif., San Gabriel—Gresco, Inc., 848 E. Valley Blvd. AT 9-5284
Calif., San Francisco—Ben Eastman, 1080 Howard St.
Calif., San Jose—Ben Eastman
Ore., Portland—Henry Kalz, 4023 No. Interstate. AT 7-9700
Wash., Seattle, Spokane & Tacoma—Equipment Supplies

GUARDIAN ELECTRIC MFG. CO., 1621 W. Walnut, Chicago 12, Ill.

Relays, Switches, Solenoids, Steppers, Complete control assemblies.

Representatives

Calif., Los Angeles—Hugh M. Harries, 3310 W. 6th. DU 8-6545
Utah, Salt Lake City—Franklin Y. Gates, 822 Continental Bank Bldg. Phone 9-1101
Wash., Seattle—Marsh Agencies, 2601 1st Ave. MA 5762

HANNA ENGINEERING WORKS, 1767 Elston Ave., Chicago 22, Ill.
Controls (compressed air, hydraulic), Cylinders (air, hydraulic), Valves, speed control (air power line, hydraulic power line).

Representatives

Ariz., Phoenix—E. D. Flournoy Co., 420 S. 3rd Ave. AL 2-8607
Calif., Pasadena—E. D. Sweetland Co., 940 No. Fair Oaks Ave. RY 1-8157
Calif., San Francisco—E. D. Sweetland Co., 151 Mission St. GA 1-2663
Ida., Wallace—Coeur d'Alene Hardware & Foundry Co., 612 Bank St.
N. Mex., Albuquerque—E. D. Flournoy Co., 211 Sixth St., S.W. Phone 3-1055
Ore., Portland—Power Transmission Products Div. of Portland Iron Works, 1107 N.W. 14th St. CA 7-1271
Wash., Seattle—H. F. Soderling Co., 1729 First Ave. So. MA 6056

HANNIFIN CORP., 501 So. Wolf Rd., Des Plaines, Ill.

Power cylinders (air, hydraulic), Air cylinder control valves, Hydraulic riving and punching equipment (portable, stationary), Presses (pneumatic, hydraulic), Air line filters, regulators and lubricators.

Representatives

Calif., Emeryville—The Rucker Co., 4700 San Pablo Ave. OL 3-5221
Calif., Sherman Oaks—Castiglia Engineering Co., 14908 Ventura Blvd. ST 4-4409
Calif., South Gate—The Rucker Co., 4956 Firestone. LO 4-2521
Colo., Denver—Landes, Zachary & Peterson, 275 Kalamath St. MA 6208
Colo., Grand Junction—Landes, Zachary & Peterson
N. Mex., Albuquerque—Landes, Zachary & Peterson
Ore., Portland—Jack Ogle & Co., 1123 S.E. Market St. BE 5-4080
Tex., El Paso—Landes, Zachary & Peterson
Utah, Salt Lake City—Landes, Zachary & Peterson, 153 1/2 W. 2nd South St. DA 2-0812
Wash., Seattle—Jack Ogle & Co., 105 Ores St. MO 2030

HANSEN MANUFACTURING CO., THE, 4031 W. 150th St., Cleveland 11, Ohio.

Quick-connective fluid line couplings, Hose (air).

Representatives

Calif., Glendale—Chester Paul Co., 1605 Victory Blvd. CH 5-3761
Calif., San Francisco—The Burke Co., 1485 Bayshore Blvd. DE 3-8261
Wash., Seattle—George W. Warden Co., 1305 Dexter Ave. AL 0622

HARTFORD STEEL BALL CO., INC., 12 Jefferson Ave., West Hartford 6, Conn.

Bearings (ball).

Branch Office

Calif., Goleta—Bldg. 117, Santa Barbara Airport. WO 8-8441

Representatives

Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St. RI 7-9191
Calif., San Francisco—George M. Philpott Co., 1060 Bryant St. HE 1-5475
Wash., Seattle—Bearing Engineering & Supply Co., 2548 Airport Way

HAULTAIN-CHAMPION CO., THE, 320 E. 8th St., Oakland 6, Calif.

Belts, V (rubber), Couplings (shaft).

(All Western Pacific states, including Hawaii, are covered out of the above office).

HEVI-DUTY ELECTRIC CO., 4212 W. Highland Blvd., Milwaukee 1, Wis.
Atmosphere generators, Furnaces (industrial heat treating, laboratory), Regulators (constant current), Transformers (dry type).

Branch Office

Calif., Culver City—10826 Venice Blvd. VE 7-1205

HEWITT-ROBINS, INC., 666 Glenbrook Rd., Stamford, Conn.

Belting, drive (rubber), Couplings (shaft), Gear (bevel, helical), Gears (worm), Hose (air, flexible metallic, hydraulic), Increasers (speed), Pillows

blocks, Pulleys, Reducers, speed (bevel gear, helical gear, planetary gear, spur gear, worm gear), Sheaves.

Branch Offices

Ariz., Phoenix—207-B Camelback Rd. AL 4-3121
Calif., Los Angeles—2604 So. Malt Ave. RA 3-4771
Colo., Denver—660 Bannock St. AC 2-8484
Ore., Portland—2034 N.E. Sandy Blvd. BE 5-1996
Utah, Salt Lake City—545 W. 8th So. St. EL 9-8731
Wash., Seattle—641 Dexter Horton Bldg. MA 8640

HILLIARD CORP., THE, 100 W. Fourth St., Elmira, N. Y.
Clutches.

Representatives

Ariz., Tucson—Central Station Equipment Co., 2323 Aviation Highway. Phone 3-2493
Calif., Los Angeles—Engineering Products Co., 1600 So. San Pedro St. RI 9-7044
Calif., San Francisco—Norman F. Coates, c/o Elder Co., 390 Seventh St. UN 1-5400
Colo., Denver—Andrew T. Lobel, 1700 Fifteenth St. MA 3221
Hawaii, Honolulu—American Factors, Ltd., P.O. Box 3230
Ore., Portland—Fred W. Carlson & Associates, 935 Northwest 12th Ave., Rm. 133. CA 8-3798
Utah, Salt Lake City—Sales Engineering Co., Inc., 526 W. 8th So. St. Phone 5-1162
Wash., Seattle—Fred W. Carlson, 1201 Dexter Ave. EL 6630

HOBERT BROTHERS, see **MOTOR GENERATOR CORP.**

HOUGHTON, E. F., & CO., 303 West Lehigh Ave., Philadelphia 33, Pa.
Leather drive belting, Hydraulic fluids, Packing, Cutting fluids, Lubricants.

Branch Offices

Calif., Los Angeles—109 North Ave. 18, CA 1-6173
Calif., San Francisco—1500 Davidson Ave. VA 4-3207

HOWARD INDUSTRIES, INC., 1760 State St., Racine, Wis.

Generators (electric), Motors (electric, fractional H.P., variable speed).

Branch Office

Calif., Los Angeles—942 S. LaBrea Ave. WE 8-2444

HYDRAULIC PRESS MFG. CO., HYDRAULIC POWER DIV., A DIV. OF KOEHRING CO., Mount Gilead, Ohio
Cylinders, Motors, Power units, Pumps, Valves.

Branch Office

Calif., Huntington Park—5301 Pacific Blvd. LO 8-1061

Representative

Wash., Seattle—Hallidie Machinery Co., 210 Hudson St. LA 9520

IMPERIAL BRASS MFG. CO., THE, 1200 W. Harrison St., Chicago 7, Ill.
Fittings and couplings (air, hydraulic), Hose (air, hydraulic), Valves (air and hydraulic power line).

Branch Offices

Calif., Los Angeles—1341 So. Hope St. PR 6028
Calif., San Francisco—476 Golden Gate Ave. OR 3-1247

Representatives

Ariz., Phoenix—Arizona Hardware Co., 1st & Jackson Sts.
Ariz., Phoenix—Ducommun Metals & Supply Co., 2626 E. Washington St.
Ariz., Tucson—Arizona Hardware Co., 119 No. Stone Ave.
Calif., Bakersfield—Tay-Holbrook, Inc., 3530 Chester Ave.
Calif., Eureka—Tay-Holbrook, Inc., 940 Bdwy.
Calif., Fresno—Tay-Holbrook, Inc., 920 M St.
Calif., Long Beach—American Wholesale Hardware Co., 1500 W. Anaheim St.
Calif., Los Angeles—Allied Supply Co., P.O. Box 2376 Terminal Annex
Calif., Los Angeles—California Hardware Co., 500 E. First St.
Calif., Los Angeles—Ducommun Metals & Supply Co., 4890 So. Alameda St.
Calif., Los Angeles—Pacific Metals Co., Ltd., 2187 So. Garfield Ave.
Calif., Los Angeles—Ward Supply Co., 1592 W. Vernon Ave.
Calif., Los Angeles—Warren & Bailey Co., 3528 So. Garfield Ave.
Calif., National City—Ducommun Metals & Supply Co., 1300 Wilson Ave.

Calif., Oakland—American Brass & Copper Co., 1920 Union St.

Calif., Oakland—Tay Holbrook, Inc., 900 Alice St.

Calif., Redding—Gerlinger Steel & Supply Co., 1527 Sacramento St.

Calif., Sacramento—Tay-Holbrook, Inc., 1801 22nd St.

Calif., Salinas—Tay-Holbrook, Inc., 101 Highway South

Calif., San Carlos—Tay-Holbrook, Inc., 605 Old County Road

Calif., San Diego—Warren & Bailey Co., 266 Seventh Ave.

Calif., San Francisco—Dallman Supply Co., 7th at Townsend

Calif., San Francisco—Dunham, Carrigan & Hayden, Kansas & Division Sts.

Calif., San Francisco—A. J. Glesener Co., 975 Bryant St.

Calif., San Francisco—Marshall-Newell Supply Co., Spear and Mission Sts.

Calif., San Francisco—C. W. Marwedel, 1235 Mission St.

Calif., San Francisco—Miller & Stern Supply Co., 1435 Folsom St.

Calif., San Francisco—Pacific Metals Co., Ltd., 3100 Nineteenth St.

Calif., San Francisco—Tay-Holbrook, Inc., 165 Eighth St.

Calif., San Jose—Tay-Holbrook, Inc., 695 Stockton Ave.

Calif., Santa Rosa—Tay-Holbrook, Inc., 251 Roberts Ave.

Calif., Stockton—Tay-Holbrook, Inc., 1234 So. Aurora St.

Calif., Vernon—Amstan Supply Div., American Radiator & Standard Sanitary Co., 3259 E. 46th St.

Nev., Reno—Tay-Holbrook, Inc., 1595 E. 2nd Ore., Portland—American Steel Warehouse Co., 425 N.E. 9th Ave.

Ore., Portland—Eagle Metals, Inc. of Oregon, 2336 No. Randolph Ave.

Ore., Portland—J. E. Haseltine & Co., 2nd and Ash Sts.

Utah, Salt Lake City—Metals Supply Co., Inc., 121-135 Social Hall Ave., P.O. Box 600

Utah, Salt Lake City—Pacific Metals Co., Ltd., 261 W. 5th So.

Wash., Seattle—Campbell Industrial Supply Co., 3433 Airport Way

Wash., Seattle—Cragin & Co., 932 First Ave., So.

Wash., Seattle—Eagle Metals Co., 4755 First Ave., So.

Wash., Seattle—Schwabacher Hardware Co., 1st Ave. and Jackson St.

Wash., Seattle—Seattle Hardware Co., 501 First Ave., So.

Wash., Spokane—Eagle Metals Co., Helena at Broadway

Wash., Spokane—Jensen-Byrd Co., Box 2172

INDUSTRIAL CONTROL PANEL CO., 517 W. Monroe St., Chicago 6, Ill.

Automatic control panels for process or machine control systems (electrical or combinations of electrical, hydraulic and pneumatic).

Representatives

Ore., Portland—Fred W. Carlson Co., 935 N.W. 12th Ave. AT 3798

Wash., Seattle—Fred W. Carlson Co., 1201 Dexter Ave. EL 6630

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

Compressors, Condensers, Engines (diesel, gas), Motors (air), Pumps, Rock drills, Tools (air, electric), Turbo-blowers.

Branch Offices

Calif., Los Angeles—1460 E. Fourth St. AN 8-6761

Calif., San Francisco—350 Brannan St. GA 1-6330

Colo., Denver—1641 Blake St. KE 4-2245

Mont., Butte—845 So. Montana St. Phone 2-0451

Ore., Portland—Rm. 1004, Broadway Bldg., Broadway and Morrison Sts. CA 3-1852

Tex., El Paso—2100 Wyoming St. Phone 2-3673

Utah, Salt Lake City—144 S.W. Temple St. DA 8-8127

Wash., Seattle—526 First Ave. So. MA 2866

I-T-E CIRCUIT BREAKER CO., 19th and Hamilton Sts., Philadelphia 30, Pa.

Circuit breakers, Ducts (bus and wiring), Electro-clutches, Insulators (porcelain), Panelboards (electric), Power switching equipment, Metal-enclosed bus, Rectifiers (mechanical), Substations (unit), Switchgear equipment, Transformers.

Branch Offices

Calif., Los Angeles—130 So. Atlantic Blvd., RA 3-5318

Calif., San Francisco—320 Fourth St. YU 2-2760

Colo., Denver—Denham Bldg., Rm. 626, 635 18th St. AC 2-0011

Representatives

Ariz., Tucson—Central Station Equipment Co., 2323 Aviation Highway. Phone 3-2493
Mont., Butte—R. E. McDonough Co., 829 Maryland Ave. Phone 2-5447
Ore., Portland—Garland Affolter Engineering, 1233 N.W. 12th Ave. CA 2-5052
Utah, Salt Lake City—Ritter Engineering Co., 136 So. Main St. DA 2-2471
Wash., Seattle—Garland Affolter Engineering, 2603 Western Ave. MU 4950

JEFFREY MANUFACTURING CO., 920 No. Fourth St., Columbus 16, Ohio.

Bearings (babbitted), Chains for drives (detachable link, roller), Clutches, Conveyors, Couplings (shaft), Crushers, Elevators (bucket), Feeders, Hoppers (track), Pillow blocks, Pulleys, Sheaves, Sprockets.

Branch Office

Calif., Burlingame—1862 Rollins Rd. OX 7-5303

Representatives

Ariz., Phoenix—Edward D. Maltby, Inc., 424 W. Jefferson Ave.
Calif., Eureka—Bearings & Transmission Products, 2930 Broadway. HI 2-5727
Calif., Fresno—Commercial Manufacturing & Supply Co., 2570 Railroad Ave. Phone 2-6101
Calif., Gardena—Alden Equipment Co., 1449 W. Rosecrans Ave. DA 9-6341
Calif., Long Beach—Edward D. Maltby, Inc., 2041 W. Anaheim
Calif., Los Angeles—Edward D. Maltby Co., Inc., 1718 So. Flower St. RI 7-9191
Calif., Maywood—Edward D. Maltby Co., Inc., 4035 E. 52nd St. LO 5-5304
Calif., Oakland—Bearing Engineering Co., 1019 Harrison St. TW 3-2251
Calif., Sacramento—Sacramento Engineering & Machine Works, 6th and X Sts. GI 3-1813
Calif., San Diego—Edward D. Maltby, Inc., 745 Fifteenth St.
Calif., San Francisco—Bearing Engineering Co., 1547 Mission St. HE 1-1500
Calif., San Francisco—General Conveyor, Inc., 870 Market St. EX 7-0737
Calif., Stockton—The Bearing Supply, 300 No. Wilson Way. HO 4-4858
Colo., Denver—Hendrie & Bolthoff Co., 1635 Seventeenth St.
Colo., Denver—E. C. Horne Machinery Co., 1726 Champa St., Suite 315. TA 5-7015
Mont., Billings—Bearings Supply Co., 15 No. 31st St. Phone 9-1195
Nev., Reno—Styris-Sutton Co., 622 So. Virginia St. Phone 2-3281
Ore., Portland—Northwest Chains & Sprockets, Inc., 123 S.W. Pine St. AT 5002
Utah, Salt Lake City—National Equipment Co., 101 W. Second So. St. Phone 3-8878
Wash., Seattle—Northwest Chains & Sprockets, Inc., 3628 E. Marginal Way. MA 8629
Wyo., Casper—Power Service Co., 355 So. Ash

JOHNS-MANVILLE CORP., 22 E. 40th St., New York 16, N. Y.

Conduits and fittings (electric), Insulations (industrial, electrical, building), Packings and friction materials, Panelboards (electric).

Branch Offices

Calif., Los Angeles—516 W. 5th St.

Calif., San Francisco—116 New Montgomery St.

Calif., Oakland—430 Fortieth St.

Colo., Denver—1755 Glenmar Place

Ore., Portland—1220 S.W. Morrison St.

Utah, Salt Lake City—109 W. 2nd So. St.

Wash., Seattle—777 Thomas St.

JOHNSON BRONZE CO., So. Mill St., New Castle, Pa.

Bearings (babbitted, sleeve).

Branch Offices

Calif., Los Angeles—1818 So. Grand Ave. RI 8-6113

Calif., San Francisco—1559 Howard St. HE 1-4542

Wash., Seattle—1525 Tenth Ave. FR 0840

JOHNSON GEAR & MFG. CO., LTD., 8th & Parker Sts., Berkeley 10, Calif.

Gears (spur, herringbone, worm, helical, straight and spiral bevel), Racks, Sprockets, Gear drives (right angle) for deep well turbine pumps and industrial use.

See advertisement on page 135

JOHNSON METAL HOSE, INC., 10 Sperry St., Waterbury 20, Conn.

Hose (air, flexible metallic).

Representatives

Calif., Burlingame—W. P. Wooldridge Co., Burlingame Ave.

Calif., Los Angeles—W. P. Wooldridge Co., 6440 Fleet St.

Wash., Spokane—Pollard & Co., W. 1835 Broadway

JORDAN—LINE

JORDAN CORP., 6013 Wiehe Rd., Cincinnati 13, Ohio.

Controls (air compressor, automatic, compressed air, gas, temperature, pressure, pump, steam, valve), Reducers (pressure), Regulators (air pressure, etc., hydraulic, steam), Valves (air—various kinds, air compressor, automatic, control—hydraulic, pressure reducing, regulating, etc.).

Branch Office
Calif., Los Angeles—727 W. 7th St. TU 4639
Representatives
Calif., Los Angeles—Frank J. Bunker, 1088 So. La Brea Ave. WY 2646
Calif., San Francisco—Trident Engineering Co., 16 Beale St. YU 6-6558
Wash., Seattle—E. H. Langdon Co., 72 Vine St.
Wash., Spokane—Pollard & Co., P.O. Box 198, FA 5395

JOY MANUFACTURING CO., Oliver Bldg., Pittsburgh 22, Pa.

Air compressors (portable, stationary), Conveyors and conveyor idlers, Hose (hydraulic), Motors (air).

See advertisement on page 76

Branch Offices
Calif., Los Angeles—5426 E. Washington Blvd. RA 3-6305
Calif., San Francisco—1155 Harrison St. HE 1-2446
Colo., Denver—1626 Wazee St. KE 4-6334
Utah, Salt Lake City—1359 So. 2nd W. HU 4-8791

KALAMAZOO DIV., THE NEW YORK AIR BRAKE CO. see NEW YORK AIR BRAKE CO., THE

KINGWELL BROS., LTD., 457 Minna St., San Francisco 3, Calif.
Bearings (sleeve).

See advertisement on page 120

Branch Office
Calif., Huntington Park—2618 E. 53rd St. LU 2-7427
Representatives
Calif., Los Angeles—Almquist Bros., 2300 E. 49th St. LU 8-9111
Calif., San Francisco—Allan P. James Co., 430 Ninth St. MA 1-5934
Colo., Denver—Union Bearing & Transmission Co., 1622 Wazee St. CH 4-6061
Ore., Portland—Davis Industrial Products, 338 N.W. Sixth Ave. AT 6211
Wash., Seattle—Industrial Products Co., 2911 First Ave., So. MA 7488

KUHLMAN ELECTRIC CO., 26th St., Bay City, Mich.

Transformers (distribution, power, instrument, dry-type, load center, specialty).

Branch Offices
Calif., Salinas—1056 Pellett Ave. Phone 3936 (West Coast Plant)
Calif., San Francisco—870 Tennessee St. AT 8-6900

Representatives
Ariz., Phoenix—Maydwell & Hartzell Sales & Engrg., Inc., 324 So. Second Ave. AL 3-9595
Calif., Los Angeles—Maydwell & Hartzell, Inc., 427 W. Fifth St. MU 7245
Calif., San Diego—Maydwell & Hartzell, Inc., P.O. Box 9381 Pacific Beach. HU 8605
Calif., San Francisco—Maydwell & Hartzell, Inc., 870 Tennessee St. AT 8-6900
Colo., Denver—Sales Engineers Co., 211-212 Wazee Market. AC 2-4893
N. Mex., Albuquerque—Joe E. Pearce & Associates, P.O. Box 796. Phone 5-3257
Ore., Portland—Maydwell & Hartzell, Inc., 2318 N.W. Vaughan. CA 8-4173
Utah, Salt Lake City—Sales Engineers Co., 2269 McClelland. Phone 22-4198
Wash., Seattle—Maydwell & Hartzell, Inc., 306 Dexter Ave. SE 2368
Wash., Spokane—E. Z. Coman, c/o Cater Transfer & Storage Co., 121 So. Monroe St. MA 4326

KURZ & ROOT CO., 232 E. North Island St., Appleton, Wis.
Generators (AC, DC), Motor generator sets, Motors (AC, DC).

Representatives
Calif., Los Angeles—Generator Equipment Co., 3409 W. Jefferson. RE 1-2401
Calif., Pasadena—R. T. Puelicher, 3151 E. Colorado. RY 1-6526

LEDEEN MANUFACTURING CO., 1600 So. San Pedro St., Los Angeles 15, Calif.

Air compressors (portable, stationary), Clutches, Controls (compressed air, hydraulic), Couplings (shaft), Cylinders (air, hydraulic), Reducers, speed (helical gear), Regulators (pressure), Valves (air power line, hydraulic power line).

Representatives
Ariz., Phoenix—Lee Redman Equipment Co., P.O. Box 151, 610 So. 19th Ave. AL 8-3794
Calif., Bakersfield—Hopper Machine Works, P.O. Box 1226, 391 26th St. Phone 4-4991
Calif., Eureka—Eureka Boiler Works, Foot of S St. HI 3-1681
Calif., Los Angeles—Engineering Products Co., 1600 So. San Pedro. RI 9-7044
Calif., Oakland—The Otrich Co., 3664 Grand Ave. TE 2-3781
Colo., Denver—Patten Engineering Co., 1745 Blake St. TA 5-3545
Hawaii, Honolulu—Hawaiian Equipment Co., Ltd., P.O. Box 2990. Phone 8-2921
Nev., Reno—Sierra Machinery Co., P.O. Box 1330, 307 Morrill Ave. Phone 2-6981
N. Mex., Albuquerque—A. E. Boyd Equipment Co., P.O. Box 745, 3108 Fourth St., N.W. Phone 4-6016
Ore., Eugene—American Steel & Supply Co., 44 7th Ave. E. Phone 5-0373
Ore., Medford—American Steel & Supply Co., P.O. Box 1346. Phone 2-7181
Ore., North Bend—Industrial Steel & Supply Co., P.O. Box 824. SK 9-2731
Ore., Portland—Portland Engineering Co., 10895 N.W. Cornell Rd. MI 4-2611
Utah, Salt Lake City—National Equipment Co., 101 W. 2nd So. St. EM 3-8878
Wash., Seattle—Chas. E. Hamilton, 209 Seneca St. EL 5919
Wash., Spokane—General Machinery Co., P.O. Box 4227, Sta. B. E. 3500 Riverside Ave. KE 1535

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.

Electronic indicators, recorders and controllers for combustion and load frequency measurement and control, Electric drive units for positioning dampers and fan louvers, pH measuring equipment, Steam temperature control for superheat and reheat sections, Oxygen measurement and control equipment.

Branch Offices
Calif., Los Angeles—5111 Via Corona Ave. AN 9-3191
Calif., San Francisco—Rm. 705 Grant Bldg., 1095 Market St. MA 1-3464
Wash., Seattle—1311 Republican St. EL 5505

LEIMAN BROS., INC., 166 Christie St., P.O. Box 1339, Newark 1, N. J.

Representatives
Calif., Los Angeles—Simonds Machinery Co., 455 E. 4th St. MU 8321
Calif., San Francisco—Simonds Machinery Co., 816 Folsom St. DO 2-6794
Ida., Wallace—Gardner Supply Co.
Ore., Portland—Power Air Products, 1107 N.W. 14th Ave.
Utah, Salt Lake City—Todd Machine Co., 4165 Hallows Dr.
Wash., Seattle—Star Machinery Co., 241 Lander St. EL 0760

LELAND ELECTRIC CO. DIV., THE, AMERICAN MACHINE & FOUNDRY CO., 1501 Webster St., Dayton 1, Ohio.

Generators (electric), Motors (electric).

Representatives
Calif., Los Angeles—Engineering Sales Co., 406 So. Main St. MA 6-9159
Calif., San Francisco—J. F. Cady, 1485 Bayshore Blvd. JU 5-4108
Colo., Denver—Hubert Kaub & Co., 1025 Santa Fe Dr. MA 3-4606
Utah, Salt Lake City—Gates Co., 200 So. Main St. Phone 9-1101

LESLIE CO., Grant Ave., Lyndhurst, N. J.

Controls (hydraulic), Regulators (pressure), Valves (air power line, hydraulic power line).

Representatives
Calif., San Francisco—Claude B. Smith Co., 200 Davis St. GA 1-4020
Calif., Santa Ana—Frank Bueche Co., 206 W. 4th. KI 7-1755
Colo., Denver—Landes, Zachary & Peterson, 2500 W. 7th Ave. MA 6203
Colo., Grand Junction—Landes, Zachary & Peterson, 2701 So. Highway 50. Phone 1609

N. Mex., Albuquerque—Landes, Zachary & Peterson, 1609 2nd St. N.W. Phone 2-7701
Ore., Portland—John H. Marvin Co., 6106 N.E. 18th Ave. MU 7913

Utah, Salt Lake City—Landes, Zachary & Peterson, 153½ W. Second So. St. Phone 2-20812
Wash., Seattle—John H. Marvin Co., 422 1st Ave. W. EL 6361
Wyo., Casper—Landes, Zachary & Peterson, 2421 E. 4th St. Phone 3-3610

LICON SWITCH & CONTROL DIV., ILLINOIS TOOL WORKS, 2501 No. Keeler Ave., Chicago 39, Ill.

Precision snap action switches, Hermetically sealed and splash proof limit switches, Hermetic toggle switches.

Representatives
Calif., El Monte—Ash M. Wood Co., Box 158, CU 3-1201
Calif., Oakland—Ash M. Wood Co., 5779 Walnut St. LO 8-5569
Wash., Seattle—Farwest Agencies, 209 First Ave. So. EL 7232

LIMA ELECTRIC MOTOR CO., THE, Findlay Rd., Lima, Ohio.

Motors (electric, poly-phase, AC; electric, single-phase, AC; variable speed), Transmission, variable speed.

Representatives
Calif., Berkeley—Moore Machinery Co., 7th and Carleton Sts. TH 3-1636
Calif., Los Angeles—Darnall Machinery Co., 315 E. Washington Blvd. RI 7-0158
Colo., Denver—Clyde P. Elliott Co., 661 Delaware St. AL 5-7988
Wash., Seattle—Starbuck Machine Tool Co., 4111 Airport Way. MU 2260

LINCOLN ENGINEERING CO. OF CALIF., 2844 So. Grand Ave., Los Angeles, Calif. RI 8-0151

Air compressors, Airline accessories, Controls, Hose (air, hydraulic), Pumps (heavy material, hydraulic), Valves (measuring).

Branch Offices
Calif., Berkeley—3033 San Pablo Ave. AS 3-6726
Ore., Portland—1018 S.E. 8th Ave. BE 4-7469

Distributors
Ariz., Phoenix—Republic Supply Co., 405 E. Roosevelt St. AL 3-0184
Calif., Arcata—Arcata Auto Supply
Calif., Avenal—Republic Supply Co., 4th and Skyline Dr. Phone 251
Calif., Bakersfield—Republic Supply Co., P.O. Box 832, FA 7-8471
Calif., Eureka—Humboldt Supply Co., 2029 Broadway. HI 2-6457
Calif., Fortuna—Fortuna Auto Supply
Calif., Fresno—Republic Supply Co., 155 Van Ness. Phone 2-7194
Calif., Fresno—Rol Pak Filter Service, 3036 Church St. Phone 2-6811
Calif., Huntington—Republic Supply Co., 1902 17th St. LE 6-4596
Calif., Long Beach—Republic Supply Co., 3080 Cherry Ave. NE 6-6042
Calif., Los Angeles—2600 So. Eastland Ave. PA 80-7151
Calif., Sacramento—Knapp Industrial Service, 515 12th St. HU 4-9203
Calif., Sacramento—Republic Supply Co., 1331 T St. HU 4-2807
Calif., San Francisco—Pauli & Griffin Co., 509 Sixth St. SU 1-4670
Calif., San Francisco—Wait Motor Supply, 234 7th St. HE 1-6116
Calif., San Jose—Republic Supply Co., 442 Park Ave. CY 5-3707
Calif., San Leandro—Republic Supply Co., 1919 Williams St. LO 2-0414
Calif., Santa Maria—Republic Supply Co., Hwy. 101 and Newlove Dr. WA 5-3657
Calif., Stockton—Hickinbotham Bros., 836 So. Aurora. Phone 5-9541
Calif., Taft—Republic Supply Co., 6th and Supply Row. Phone 5-4191
Calif., Ventura—Republic Supply Co., Ventura Ave. MI 3-6158

LINE ELECTRIC CO., 1407 McCarter Hwy., Newark 4, N. J.

Buzzers (AC, vibrating armature type), Panelboards (electric), Relays (medium power, 10-20 amp., 115 VAC, non-inducting).

Representatives
Ariz., Phoenix—E. V. Roberts, 909 No. 1st St. AL 4-4664
Calif., Los Angeles—E. V. Roberts, 5065 W. Washington Blvd. WE 8-2541
Calif., Redwood City—E. V. Roberts, 61 Renato Court. EM 8-7125
Wash., Seattle—C. B. Parsons Co., 3028 1st Ave. MU 3933

LINK-BELT—MASTER

Representatives

Calif., Oakland—E. L. Parsons, 600 16th St.
TW 3-1577
Ore., Portland—Edward Schiefelblin, 1730
N. W. 25th Ave. CA 3-5345
Wash., Seattle—Chain Gear, Inc., 821 1st Ave.
So. MA 7000

LUFKIN FOUNDRY & MACHINE CO., Lufkin, Tex.

Herringbone gear reducers, High speed increasers
(herringbone or double helical).

See advertisement on pages 70, 71

Branch Offices

Calif., Bakersfield—30th and M Sts. FA 7-8564
Calif., Los Angeles—5959 So. Alameda. LU
5-1201

Representative

Ore., Portland—J. W. Minder Chain & Gear
Co., 307 S.E. Hawthorne Blvd. BE 6-1131

MANHEIM MFG. & BELTING CO., 271 Stiegel St., Manheim, Pa.

Belting, drive (link), Belts, V (rubber).

Representatives

Calif., Los Angeles—A. W. Nash, 2112 So. Atlantic Blvd.
Calif., San Francisco—E. D. Samson, 420 Market St.
Wash., Seattle—T. T. Watson, 508 5th Ave. So.

MANNING, MAXWELL & MOORE, INC., CONSOLIDATED ASHCROFT HANCOCK DIV., 250 E. Main St., Stratford, Conn.

Aircraft instruments, Electronic process control instruments, Gauges, Thermometers, Valves.

Branch Office

Calif., Los Angeles—1320 Rio Vista Ave. AN
3-6133

Representative

Utah, Salt Lake City—Lang Co., P.O. Box 479.
Phone 3-5831

MARLIN-ROCKWELL CORP., 402 Chandler St., Jamestown, N. Y.

Bearings (ball and roller including super-precision, shielded and sealed types), Instrument and aircraft control bearings, Power transmission bearings.

Branch Office

Calif., San Francisco—M-R-C Bearings Service Co., 1234 Mariposa St. KL 2-3457

Representatives

Ariz., Phoenix—Edward D. Maltby Co., 424 W. Jefferson. AL 4-9227
Calif., Long Beach—Edward D. Maltby Co., 2041 W. Anaheim St. HE 7-1808
Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St. RI 7-9191
Calif., Maywood—Edward D. Maltby Co., 4035 E. 52nd St. LO 5-5304
Calif., San Diego—Edward D. Maltby Co., 745 15th St. BE 3-7278
Calif., San Diego—Motor Parts Warehouse Co., 729 Broadway. FL 5-7260
Ore., Portland—Brown Bearing Co., 217 N.W. 2nd Ave. AT 6529
Wash., Seattle—Brown Bearing Co., 2440 First Ave., So. MA 2404
Wash., Spokane—Brown Bearing Co., W. 1102 First Ave. MA 3293

MASON-NEILAN DIV., WORTHINGTON CORP., Norwood, Mass.

Controllers (liquid level), Control instruments, Valves (diaphragm control, pressure regulating).

Branch Offices

Calif., Los Angeles—2822 E. Olympic Blvd. AN 1-1418
Calif., San Francisco—111 Sutter St. EX 7-0550
Wash., Seattle—912 Elliott Ave. GA 0141

Representative

Ariz., Phoenix—George S. Thompson Co., 915 So. Central Ave.
Calif., San Francisco—Denver Fire Clay Co., 2301 Blake St. TA 5-0251
Utah, Salt Lake City—Denver Fire Clay Co., 225 W. South Temple. Phone 4-5565

MASTER ELECTRIC CO., THE, 126 Davis Ave., Dayton 1, Ohio

Bases (motor), Gearmotors (reduction ratios up to 432:1), Fluid drive motors, Motors (electric, magnetic or dynamic types, variable speed).

Branch Offices

Ariz., Phoenix—5545 No. Kay Drive. AL 8-8511
Calif., Los Angeles—1589 Grande Vista Ave. AN 1-5105
Calif., San Francisco—270 Seventh St. MA 1-1244

LINK-BELT CO., Prudential Plaza, Chicago 1, Ill.

Bases (motor), Bearings (babbitted, ball, roller, sleeve), Belting, drive (chain or link, rubber), Belts (timing), Belts, V (rubber), Chains for drives (detachable link, roller, silent transmission, steel, cast), Clutches (friction), Collars (shaft), Couplings (shaft), Fluid drives, Gearmotors, Gears (bevel, helical, worm), Gear drives (in-line helical, parallel shaft, worm), Hangers (shaft), Increasers (speed), Motors (gear, variable speed), Pillow blocks, Pulleys, Reducers, speed (helical gear, shaft mounted, spur gear, worm gear), Sprockets, Transmissions, variable speed, Variable speed drives.

See advertisement on pages 6, 7

Plants, Branch Stores or District Sales Offices

Calif., Los Angeles—361 So. Anderson St. AN 8-6171
Calif., Oakland—1025 Harrison St. HI 4-4255
Calif., San Francisco—400 Paul Ave. JU 7-6400
Colo., Denver—Schloss & Shubart, 1626 Wazee St. AC 2-2741
Ore., Portland—3030 N.W. Industrial St. CA 4-2601
Utah, Salt Lake City—108 So. Fourth W. St. DA 2-2539
Wash., Seattle—3405 Sixth Ave., So. SE 8200
Wash., Spokane—No. 1303 Washington St. FA 8-5820

Distributors

Ariz., Phoenix—Thunderbird Sales Corp., 2255 W. McDowell. AL 4-8874
Ariz., Prescott—Arizona Mining Supply Corp., P.O. Box 110, Phone 310
Calif., Bakersfield—California Truck & Industrial Equipment Co., 2501 Brundage Lane. FA 5-5914
Calif., Colton—Valley Industrial Supply Co., 401 So. 8th St. Phone 2111
Calif., El Centro—Valley Auto Supply, 633 State St. EL 2-3391
Calif., Eureka—Fred E. Barnett Co., Broadway and Harris Sts. Phone 2-3791
Calif., Fresno—Bearings Supply Co., 2938 Hamilton Ave. Phone 3-7144
Calif., Healdsburg—Healdsburg Machine Co., 452 West St. Phone 386
Calif., Los Angeles—General Bearings Co., 2017 Santa Fe Ave. TR 2338
Calif., Modesto—Geiger Iron Works, Inc., Grand and Willow Sts. LA 3-8387
Calif., Monterey—Sweet Service Co., 534 Washington St. Phone 5-4119
Calif., Oakland—American Ball & Roller Bearing Co., 273 26th St. HI 4-8892
Calif., Ontario—Valley Industrial Supply Co., Inc., 1170 Holt Blvd. YU 6-3827
Calif., Redding—Cascade Industrial Supply, Inc., Highway 99 South. Phone 1195
Calif., Sacramento—Geiger Iron Works, Inc., 2425 24th St. GL 1-7214
Calif., San Diego—Gould Hardware & Machinery Co., 2212 Main St. BE 2-6174
Calif., Santa Cruz—Sweet Service Co., 504 Front St. GA 3-5697
Calif., Stockton—Geiger Iron Works, Inc., Scotts Ave. and Pilgrim St. HO 6-8623
Calif., Ukiah—Fred E. Barnett Co., North Highway 101. HO 2-6554
Calif., Watsonville—Sweet Service Co., 38 Alexander St. Phone 4-4775
Ida., Parma—Transmission Products (Div. Parma Water Lifter Co.), Phone 2-2611
Ida., Pocatello—Western Bearings, Inc., 156 So. Third St. Phone 3518
Mont., Missoula—Missoula Mercantile Co., Front and Higgins. Phone 2-2111
Nev., Reno—Sierra Machinery Co., 307 Morrill Ave. Phone 3-1301
Ore., Coos Bay—Coos Bay Supply Co., 1023 So. Broadway. CO 7-4111
Ore., Eugene—American Steel & Supply Co., 51 E. 7th St. Phone 5-0378
Ore., Klamath Falls—Fred E. Barnett Co. of Oregon, 600 Spring St. TU 4-5153
Ore., Medford—American Steel & Supply, Medford, Inc., 703 So. Grape St. Phone 2-7181
Ore., Portland—Power Transmission Products (Div. Portland Iron Works), 1107 N.W. 14th Ave. CA 7-1271
Ore., Roseburg—Douglas Supply Co., 649 N.E. Rose St. OR 3-6633
Utah, Salt Lake City—Industrial Supply Co., Inc., 121-135 Social Hall Ave. EM 3-6727
Wash., Aberdeen—Grays Harbor Equipment Co., 419 So. F St. Phone 331
Wash., Everett—Everett Trans. & Rubber Co., 2925 Rucker Ave. BA 6767
Wash., Hoquiam—Lamb-Grays Harbor Co., Blaine and Firman Sts. Phone 1000
Wash., Seattle—Bearing Engineering & Supply Co., 65 Horton St. MA 2744
Wash., Walla Walla—Drumheller Co., 1 W. Alder St. Phone 48
Wash., Wenatchee—Wells & Wade, Inc., 201-215 So. Wenatchee Ave. NO 2-7173
Wash., Yakima—Central Chain & Transmission Co., Inc., 709 So. First St.

LOGANSPOUT MACHINE CO., INC., Foot of West Linden Ave., Logansport, Ind.

Controls (compressed air, hydraulic), Cylinders (air, hydraulic), Valves (air power line, hydraulic power line).

Representatives

Ariz., Phoenix—Southwest Machine Tool Corp., Heard Bldg.
Calif., Los Angeles—Schumann Equipment Co., 5392 Alhambra Ave.
Calif., San Jose—J. F. Gertz Co., 1264 Monroe Colo., Denver—I. J. Esbensen Co., 1725 E. 17th Ave.
Wash., Seattle—G. A. Sedman, 2339 Federal Ave.

LOUIS ALLIS CO., THE, 427 E. Stewart St., Milwaukee 1, Wis.

Bases (motor), Controls (electric motor), Gearmotors, Motors (electric DC, electric poly-phase and single-phase AC, variable speed), Panelboards (electric), Reducers, speed (bevel gear, helical gear, worm gear), Transmissions, variable speed.

Branch Offices

Calif., Los Angeles—1709 W. 8th St. DU 5-3941
Calif., San Francisco—970 Tennessee Ave. VA 6-3545
Colo., Denver—1025 Santa Fe Drive. MA 3-4606
Ore., Portland—P. O. Box 7712. AT 2-3588
Utah, Salt Lake City—918 E. 21st So.
Wash., Seattle—708 5th Ave. So.

Representatives

Ariz., Phoenix—Daley Electric Co., 1825 E. Jefferson
Calif., Arcata—Humboldt Machine Works, 937 Tenth St. Phone 12
Calif., Burbank—Valley Equipment & Supply, 439 1/2 So. Victory
Calif., Fresno—Gordon Equipment Co., 2309 Los Angeles St. Phone 4-2877
Calif., Hemet—T. M. Morrow Equipment Co., P. O. Box 577. Phone 3561
Calif., Los Angeles—Progressive Electric Co., 2112 Santa Fe
Calif., Los Angeles—Sweinhardt Electric Co., 2900 E. Olympic. AN 3-7456
Calif., Sacramento—Van Alstyne & Sons, 2512 Broadway. GL 7-9835
Calif., San Diego—Gould Hardware & Machinery Co., 2212 Main St.
Calif., San Francisco—Atlas Electric Co., 617 7th St. KL 2-3676
Calif., San Francisco—Charles A. Fowler, 979 Bryant St. UN 3-6010
Calif., San Francisco—Fred G. Guthrie, 420 Market St. EX 2-8296
Colo., Denver—Power Transmission Co., 4965 Jackson St. DU 8-1681
Colo., Denver—Ward Electric, 116 Tenth St.
Colo., Denver—Weaver Electric, 1721 Larimer St. AL 5-5481
Colo., Grand Junction—Williams Electric Motor Co., 761 So. 7th St.
Ida., Boise—Idaho Chain & Sprocket Co., 2801 Warm Springs. Phone 2-5464
Ida., Lewiston—Jameson Machinery & Supply, 855 D St. Phone 3-4517
Ida., Pocatello—C & L Electric Co., 410 So. Main St. Phone 513
Mont., Billings—Great Northern Tool & Supply, 2224 Minneapolis Ave. Phone 2-2141
Mont., Great Falls—Mosch Electric Co., 10 Second St. So.
N. Mex., Albuquerque—Harry Cornelius, 1510 Second St. Phone 3-1776
N. Mex., Albuquerque—Technical Service Co., 730 Haines St. Phone 7-1508
Ore., Bend—Bend Iron Works, P. O. Box 807. Phone 74
Ore., Eugene—Electric Steel Foundry, 1464 W. 6th St. AT 2141
Ore., Portland—George B. Schetky, 1825 N.W. Vaughn
Ore., Portland—Stubbs Electric Co., 33 N.W. Park Ave. BR 5404
Utah, Ogden—Johnson Electric Co., 377 22nd St. Phone 9219
Utah, Salt Lake City—Nickerson Machinery Co., 158 W. Fourth. Phone 4-9784
Wash., Pasco—Lehl Electric Supply, 327 W. Clark. Phone 7596
Wash., Seattle—Tyee Machinery Co., 1924 First Ave. MU 5881
Wash., Yakima—Dodge Yakima Supply, 109 So. Front St. Phone 6495
Wyo., Casper—Electric Service, 1120 E. B St. Phone 2-7866

LOVEJOY FLEXIBLE COUPLING CO., 4949 West Lake St., Chicago 44, Ill.

Flexible couplings, Pulleys (variable speed), Universal joints (aircraft type), Motor bases, Shaft couplings.

Branch Office

Calif., El Monte—Lovejoy Sales & Service Co., 11126 Rush St. FO 0-0531

MERCROID—NEW HAMPSHIRE

Colo., Denver—1028 Champa St. CH 4-0558
Ore., Portland—801 S.W. Front Ave. CA 8-7395
Utah, Salt Lake City—1479 So. Main St. Phone 64-1133

Wash., Seattle—241 Lander St. EL 0760
Wash., Spokane—E. 415 Sprague Ave. RI 6121

Representatives
Calif., Arcata—Munnell & Sherrill of Calif., 1041 F St.

Calif., Fresno—Pacific Mill & Mine Supply Co., 530 Van Ness Ave.

Calif., Los Angeles—Smallcomb Electric Co., 1120 So. Main St.

Calif., Modesto—Geiger Iron Works, 124 Willow St.

Calif., Sacramento—Geiger Iron Works, 2425 24th St.

Calif., San Diego—Ets-Hokin & Galvan, 2295 E. Belt St.

Calif., San Francisco—McCrea Engineering Supply Co., 285 Seventh St.

Calif., San Jose—Pacific Hardware & Steel Co., 106 Stockton Ave.

Calif., Stockton—Geiger Iron Works, 1140 E. Scotts Ave.

Calif., Wilmington—Ets-Hokin & Galvan, 218 No. Avalon Blvd.

Colo., Denver—Wasee Electric Co., 1818 Market St.

Ida., Pocatello—Paul Roberts, 850 So. Main St. N. Mex., Albuquerque—Electric Motor Co., 1801 Lomas Blvd. N.E.

Ore., Klamath Falls—Lorenz Co.

Ore., Medford—Lorenz Co.

Utah, Salt Lake City—Bearings Service & Supply Co., 1207 So. Main St.

MERCROID CORP., THE, 4201 Belmont Ave., Chicago 41, Ill.

See advertisement on page 126

Mercury switch equipped automatic controls for pressure, differential pressure, temperature, liquid level, mechanical movement, Relays and hermetically sealed mercury contact switches.

Representatives

Calif., Los Angeles—Jensen Instrument Co., 1919 W. Beverly Blvd.

Calif., San Francisco—Jensen Instrument Co., 429 Bryant St.

Colo., Denver—J. M. Warner, 600 W. 48th St.

Ore., Portland—Johnson Heating Supply Co., 232 N.E. 9th Ave.

Utah, Salt Lake City—Stevens Sales Co., 1482 Major St.

Wash., Seattle—E. H. Langdon Co., 72 Vine St.

MERCURY CLUTCH DIV., AUTOMATIC STEEL PRODUCTS, INC., 1201 Camden Ave., S.W., Canton 6, Ohio
Clutches (automatic, centrifugal—for gasoline engines and electric motors).

Representatives

Calif., Alhambra—W. S. Cox, 1819 W. Valley Blvd. CU 3-2851

Calif., Oakland—Dean Lewis Associates, 4385 Piedmont Ave. OL 4-0613

Wash., Seattle—Marsh Agencies, 2601 First St. MA 8761

Distributors

Ariz., Phoenix—motor supply Co., 402-414 No. Central

Ariz., Tucson—Motor Supply Co., 140 So. 6th St.

Calif., Los Angeles—Magneto Sales & Service, 751 Towne Ave.

Calif., San Francisco—Frank Edwards Co., 382-4 Sixth Ave.

Ore., Portland—The Stevens Corp., 1411 N.W. Flanders

Utah, Salt Lake City—Frank Edwards Co., 511 So. State St.

MERIDAN CORP., see FLEX-O-TUBE DIV.

MICRO-SWITCH DIV., MINNEAPOLIS-HONEYWELL CO., Chicago and Spring Sts., Freeport, Ill.
Switches (automatic, electric).

Branch Offices

Ariz., Phoenix—4125 No. Seventh Ave. CR 4-7791

Calif., Los Angeles—6620 Telegraph Rd. RA 3-7104

Calif., San Francisco—2 Dorman Ave. AT 8-1221

Colo., Denver—1600 W. 13th Ave. AM 6-2491

Wash., Seattle—401 Pontius Ave. No. MU 4580

Distributors

Ariz., Phoenix—Electric Supply, Inc., 202 So. 7th Ave. AL 2-2343

Calif., Arcata—Industrial Electric Service Co., 960 Fourth St.

Calif., Fresno—Electric Motor Shop, 253 Fulton St., Phone 3-1154

Calif., Glendale—Air Associates, Inc., 1231 Air Way. CI 4-4151

Calif., Los Angeles—Andrews Hardware & Metal Co., 334 So. Main St. MU 6111

Calif., Los Angeles—Radio Products Sales, Inc. 1501 So. Hill St. RI 9-7471

Calif., Los Angeles—Radio Television Supply Co., 341 W. 18th St. RI 8-7131

Calif., Oakland—Westehn Electric-Mechanical Co., Inc., 300 Broadway. TE 2-8653

Calif., Sacramento—Hoffman Sales Div. of Hoffman Lab., Inc., 115 R St. GI 3-4663

Calif., San Bernardino—Tri-County Electrical Wholesalers, 453 So. I St. Phone 7895

Calif., San Diego—Pacific Wholesale Electric Co., 702 State St. BE 4-5136

Calif., San Francisco—C. J. Hendry Co., 27 Main St. DO 2-4242

Calif., San Francisco—Phillips & Edwards Electric Corp., 265 Vermont. HE 1-7400

Colo., Denver—Ryall Electric Supply Co., 500 Lincoln St. AC 2-4521

Ore., Eugene—Tillman & Booth, Inc., 215 W. Fifth Ave. Phone 3-3301

Ore., Portland—North Coast Electric Co., 625 N.W. Everett St. BR 3621

Utah, Salt Lake City—Stuart Electric, 13 East 15th St. HU 5-5424

Wash., Aberdeen—Industrial Electric Service Co., 319 So. First. Phone 956

Wash., Seattle—North Coast Electric Co., 171 Jackson St. MU 9444

Wash., Spokane—Columbia Electric & Mfg. Co. 3420 Ferry Ave. KE 0611

Wash., Tacoma—Love Electric Co., 1914 Market St. BR 4101

MILLER FLUID POWER DIV., FLICK-REEDY CORP., 2040 No. Hawthorne Ave., Melrose Park, Ill.
Cylinders (air, hydraulic).

Branch Office

Calif., San Francisco—551 Buckingham Way. MO 4-3531

Representatives

Calif., So. Pasadena—Teglen Engineering Co., 1942 Huntington Ave. PY 1-2856

Colo., Aurora (Denver)—Alta Engineering Co., 1988 Nome St. EM 6-3557

Wash., Seattle—George W. Warden Co., 1305 Dexter Ave. AL 0622

MINDER, J. W., CHAIN & GEAR CO., 6011 So. Central Ave., Los Angeles 1, Calif. AD 3-7221
Transmission equipment (mechanical power), Gears (bevel, helical, spur, etc.), Gears (worm), Sheaves, Sprockets.

See advertisement on page 78

Branch Office

Ore., Portland—307 S.E. Hawthorne Blvd. BE 6-1131

MINIATURE PRECISION BEARINGS, INC., Precision Park, Keene, N. H.
Miniature precision ball bearings.

Branch Office

Calif., Los Angeles—6214 W. Manchester Ave. OR 8-0027

Representatives

Ariz., Phoenix—Edward D. Maltby Co., 424 W. Jefferson. AL 3-3789

Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St. RI 7-9191

Calif., Sacramento—Geo. M. Philpott Co., 6260 Folsom Blvd. GL 2-2641

Calif., San Francisco—Geo. M. Philpott Co., 1060 Bryant St. HE 1-5475

Wash., Seattle—Bearing Engineering & Supply Co., 2548 Airport Way. MA 2744

MINNEAPOLIS—HONEYWELL CO., see MICRO-SWITCH DIV.

MODERNAIR CORP., 400 Preda St., San Leandro, Calif.
Controls (compressed air, hydraulic), Cylinders (air, hydraulic), Valves (air power line, hydraulic power line).

Representatives

Ariz., Phoenix—Air-Draulics Co., 31 So. 3rd Ave. at Jefferson

Calif., Burbank—Elect-Air Tool Co., 310 W. Verdugo Ave.

Calif., Los Angeles—Circle Seal Supply Co., 4863 Telegraph Rd.

Calif., Los Angeles—Huddleston Equipment Co., 1148 So. Los Angeles St.

Calif., Oakland—The H. E. Linney Co., 5801 College Ave.

Calif., Redding—Gerlinger Steel Supply Co., 1527 Sacramento St.

Calif., Sacramento—Capital Machine & Welding Co., 83 No. 17th St.

Calif., San Diego—General Industrial Supply Co., 1115 F St.

Calif., San Francisco—Power-Mac Co., 467 So. Van Ness Ave.

Calif., San Jose—Orchard Supply Hardware, 720 W. San Carlos St.

Calif., Ukiah—Klamath Machine & Locomotive Works of California, 720 State St.

Colo., Denver—Plant Equipment Co., 1803 Wazee St.

Ore., Portland—Western Machinery Corp., 1011 S.E. 9th St.

Utah, Salt Lake City—Equipment Engineering Co., 1761 So. 8th W.

Wash., Seattle—F. H. Soderling Co., 1729 First Ave. So.

Wash., Tacoma—Webster-Robinson Machinery, Puyallup Ave. at A St.

MOLONEY ELECTRIC CO., 5390 Bircher Blvd., St. Louis 20, Mo.
Transformers.

Representatives

Calif., Los Angeles—Garland-Affolter Engineering Corp., Subway Terminal Bldg. MI 1864

Calif., San Francisco—Garland-Affolter Engineering Corp., 58 Sutter St. SU 1-6806

Ore., Portland—Garland-Affolter Engineering Corp., 1235 N.W. 12th St. CA 2-5052

Wash., Seattle—Garland-Affolter Engineering Corp., 2603 Western Ave. MU 4950

MORSE CHAIN CO., Ithaca, N. Y.
Chains for drives (roller, silent), Couplings (shaft, flexible), Clutches (industrial overrunning, friction), Reducers, speed (bevel gear, helical gear, worm gear), Sprockets, Transmission, variable speed.

Representatives

Calif., Los Angeles—J. W. Minder Chain & Gear Co., 6011 So. Central Ave. AD 3-7221

Calif., Maywood—Edward D. Maltby Co., Inc., 4035 E. 52nd St. LO 5-5304

Calif., San Francisco—Adam-Hill Co., 244-246 Ninth St. MA 4137

Ore., Portland—J. W. Minder Chain & Gear Co., 307 S.E. Hawthorne Blvd. BE 6-1131

Ore., Portland—Power Transmission Products, 1107 N.W. 14th Ave. CA 7-1271

Wash., Seattle—Chain Gear, Inc., 820-824 First Ave. So. SE 8010

MOTOR GENERATOR CORP., affiliate of **HOBART BROTHERS**, W. Water St., Troy, Ohio
Battery chargers, Ground power equipment, Power plants.

Representatives

Calif., Los Angeles—Fred Pelletier Co., 1014 Venice Blvd. RI 9-5698

Calif., San Francisco—McCormick-Morgan Co., 324 Fifth St. SU 1-6591

Colo., Denver—Toncray Equipment Co., 1732 Blake St. CH 4-1102

Ore., Portland—Pacific Battery Mfg. Co., 427 N.E. Cook St. AT 8-1449

Wash., Seattle—Industrial Products, 2911 1st Ave. So. MA 7488

NATIONAL ELECTRIC PRODUCTS CORP., 2 Gateway Center, Pittsburgh 22, Pa.
Electrical wiring materials.

Branch Offices

Ariz., Phoenix—603 So. First Ave. AL 8-5778

Calif., Los Angeles—714 W. Olympic Blvd. RI 8-6123

Calif., San Francisco—400 Potrero Ave. UN 1-1145

Colo., Denver—3327 Brighton Blvd. TA 5-5836

Ore., Portland—1220 S.W. Stark St. CA 2-2456

Utah, Salt Lake City—19 W. South Temple. DA 2-2701

Wash., Seattle—1049 Sixth Ave. So. EL 3776

NEW DEPARTURE DIV., GENERAL MOTORS CORP., 269 No. Main St., Bristol, Conn.
Bearings (ball).

Branch Offices

Calif., Berkeley—1716 Fourth St. LA 8-8750

Calif., Los Angeles—5935 Gifford Ave. LU 3-2301

Wash., Seattle—5000 1st Ave. So. LA 5920

NEW HAMPSHIRE BALL BEARINGS, INC., Peterborough, N. H.
Precision instrument ball bearings.

Branch Office

Calif., Pasadena—434 No. Lake Ave. RY 1-0651

NEW YORK AIR-RAMSEY

NEW YORK AIR BRAKE CO., THE, KALAMAZOO DIV., 9000 E. Michigan Ave., Kalamazoo, Mich.
Controls, Cylinders, Motors, Pumps, Valves (all hydraulic).

Branch Office
Calif., Walnut Creek—242 Marshall Dr. YE 4-5163
Representatives
Calif., Oakland—The Rucker Co., 4700 San Pablo Ave.
Calif., South Gate—The Rucker Co., 4956 Firestone Blvd.
Wash., Seattle—The Rucker Co., 1000 4th Ave. So.

NEW YORK BELTING & PACKING CO., 1 Market St., Passaic, N. J.

Complete line of all types of transmission belting (rubber) including flat, V, timing, connected-type and link-type, for every industrial power transmission requirement; all types of industrial rubber hose.

Branch Offices
Calif., Los Angeles—4559 E. Sheila St. RI 9-3802
Calif., Oakland—1276 W. Grand Ave. HI 4-6984
Calif., San Francisco—6025 Third St. MI 8-3424
Colo., Denver—1635 17th St. KE 4-4111
Ore., Portland—6725 N.E. 25th Ave. PR 0260
Representatives
Calif., Fresno—Central Supply Co., 424 M St. Phone 2-4765
Calif., Los Angeles—Degen-Fiege Co., 4559 E. Sheila St. AN 9-0751
Colo., Denver—Hendrie & Bolthoff Co., 1635 17th St. KE 4-4111
Ore., Klamath Falls—Mory & Van Dyke, Inc., 638 Klamath Ave.
Ore., Portland—Woodbury & Co., Swan Island. BU 5-4611

NICE BALL BEARING CO., 30th and Hunting Park Ave., Philadelphia 40, Pa.

Ball bearings, Retainers, Sheaves.

Distributors
Ariz., Phoenix—Garrett Supply Co.
Ariz., Phoenix—Edward D. Maltby Co., Inc.
Calif., Fresno—General Bearings Co.
Calif., Long Beach—Pacific Bearings Co.
Calif., Los Angeles—Andrews Hardware & Metal Co.
Calif., Los Angeles—Bearing Sales Co.
Calif., Los Angeles—Bearing Specialty Co.
Calif., Los Angeles—Garrett Supply Co.
Calif., Los Angeles—Edward D. Maltby Co., Inc.
Calif., Los Angeles—Pacific Bearings Co.
Calif., Maywood—Bearing Specialty Co.
Calif., Maywood—Edward D. Maltby Co., Inc.
Calif., Oakland—Bearing Engineering Co.
Calif., Oakland—Bearing Specialty Co.
Calif., Sacramento—Bearing House
Calif., Sacramento—Bearing Specialty Co.
Calif., San Bernardino—Pacific Bearings Co.
Calif., San Diego—Edward D. Maltby Co., Inc.
Calif., San Francisco—Bearing Engineering Co.
Calif., San Francisco—Bearing Specialty Co.
Calif., San Francisco—C. W. Marwedel
Calif., San Jose—Masterson Bearing Co.
Calif., San Leandro—Republic Supply Co. of Calif.
Calif., Stockton—Bearing Supply Co.
Ore., Eugene—Bearing Sales & Service, Inc.
Ore., Portland—Bearing Sales & Service, Inc.
Ore., Roseburg—Bearing Sales & Service, Inc.
Wash., Aberdeen—Bearing Sales & Service, Inc.
Wash., Everett—Bearing Sales & Service, Inc.
Wash., Longview—Bearing Sales & Service, Inc.
Wash., Seattle—Bearing Sales & Service, Inc.
Wash., Seattle—Cragin & Company
Wash., Tacoma—Bearing Sales & Service, Inc.

NORGREN, C. A., CO., 3400 So. Elati, Englewood, Colo.

Control valves for compressed air lines, Cutting tools, Cylinders (air), Filters (air line), Lubricators (air line, bearing), Machine components, Other pneumatic equipment, Regulators (pressure), Spray systems (cutting oil), Valves (relief, flow control, needle, blow gun).

Representatives
Calif., San Francisco—The Burke Co., 1485 Bayshore Blvd. DE 8-8261
Calif., South Pasadena—Teglen Engineering Co., 1942 Huntington Dr. PY 1-2856
Colo., Denver—E. C. Wild Co., 695 So. Garfield St. SP 7-2862
Ore., Portland—Power Transmission Products, 1107 N.W. 14th Ave. CA 7-1271
Wash., Seattle—George W. Warden Co., 1805 Dexter Ave. AL 0622

NOVO PUMP & ENGINE CO., 702 Porter St., Lansing 5, Mich.

Hoists, Pavement breaker, Centrifugal, diaphragm and pressure pumps.

Representatives
Ariz., Phoenix—Arizona Equipment Sales, Inc., 2812 Grand Ave.
Calif., Los Angeles—Garlinghouse, Fremont & Co., 6046 E. Washington
Colo., Denver—Air Rentals, Inc., 3301 Walnut St.
Tex., El Paso—Pressler & Campbell, Inc., 2800 Bassett Ave. Phone 2-9056
Utah, Salt Lake City—Heiner Equipment & Supply Co., 501 W. 7th St.

OILGEAR CO., THE, 1560 W. Pierce St., Milwaukee 4, Wis.

Fluid power cylinders, motors, pumps, transmissions and valves.

Branch Offices
Calif., Los Angeles—727 W. 7th St. VA 8544
Wash., Seattle—914 Arctic Bldg. MA 7445

OKONITE CO., THE, 220 Passaic St., Passaic, N. J.

Wire and cable (electric).

Branch Offices
Calif., Los Angeles—427 W. 5th St. MI 9677
Calif., San Francisco—701 Phelps St. VA 4-7474
Ore., Portland—880 Pittcock Block. CA 8-3173
Wash., Seattle—1011 Securities Bldg., 1904 Third Ave. SE 5277
Representatives
Colo., Denver—Sales Engineers Co., 211-212 Wazee St. AC 2-4593
Utah, Salt Lake City—Sales Engineers Co., 2269 McClelland St. Phone 2-2419

ORR & SEMBOWER, INC., Morgan-town Rd., Reading, Pa.

Automatic packaged boilers, steam and hot water (15-500 hp.). Complete automatic lumber kiln units, Power-Pak boilers (10-25 hp.).

Branch Office
Utah, Salt Lake City—4165 Holloway Dr. CR 7-2148
Representatives
Calif., Los Angeles—Fred S. Renaud & Co., 8115 So. Western Ave. PL 2-6181
Calif., San Francisco—Edgar Martin Co., 50 Hawthorne St. YU 2-5680
Ida., Boise—Richardson Equipment Co., 612 Front St. Phone 3-9431
Ore., Portland—Ponder Oil Burner Co., 309-15 N.E. Wygant. AT 8-4500
Tex., El Paso—General Equipment Sales, 605 Mills Bldg. Phone 2-5161
Utah, Salt Lake City—Thermal Engineering Co., 1492 Major St. IN 6-8793
Wash., Seattle—Superior Engineering Co., 15th & E. Madison. CA 3300

PARKER, SID E., BOILER MFG. CO., INC., 2035 E. 37th St., Los Angeles 58, Calif. AD 3-4211

Hot water boilers, Steam boilers, Water softeners.

Representatives
Calif., Berkeley—Clyde Co., 920 Grayson St. TH 5-6130
Calif., Sacramento—Stocker's Boiler & Welding Works, 500 Broadway. GI 2-3062
Colo., Denver—E. F. Murr Co., 2542 West 28th Ave. GE 3-3334
N. Mex., Albuquerque—Hale Sanitary Supply, 1024 No. 4th St. Phone 7-9555
Ore., Portland—Russ Chamberlin Co., 234 S.E. 12th Ave. BE 2-7124
Wash., Seattle—Brooks & Co., 2605 Second Ave. SE 1570
Wash., Tacoma—New Era Equipment Co., No. 27th & Proctor. PR 1425

PEERLESS ELECTRIC CO., THE, 1401 W. Market St., Warren, Ohio

Motors (electric DC, electric poly-phase and single-phase AC).

Representative
Calif., Los Angeles—Hoyt & Sweet, 1132 E. 12th St.

PERFECTION GEAR CO., see AMERICAN STOCK GEAR DIV.

PHILADELPHIA GEAR WORKS, INC., Erie Ave. and G Sts., Philadelphia 34, Pa.

Bases (motor), Chains for drives (detachable link, roller, silent transmission), Controls (electric motor), Couplings (shaft), Gearmotors, Gears (bevel, helical, spur, etc.), Gears (worm), Sprockets, Transmission, variable speed, Valves (air power line).

Representatives
Calif., Huntington Park—Nicholas A. D'Arcy, Jr., 7535 Marbrisa St.
Calif., San Francisco—Wm. H. Edis & Associates, Abbott Bldg., 1045 Sansome St.
Ore., Portland—W. G. Ballantyne Co., 1215 N.W. Everett St.
Wash., Seattle—Robert E. Kunx Co., 408 Broad St.

PORTER, H. K., CO., INC., see W-5 FITTINGS DIV.

POWERS REGULATOR CO., 3400 Oakton St., Skokie, Ill.

Controls (automatic temperature, humidity and pressure) for heating, air conditioning and processes, Instruments (measuring and testing), Regulators (pressure, temperature), Traps (steam) Valves (air power line, hydraulic power line).

Branch Offices
Calif., Los Angeles—3200 W. Temple St. DU 4-4187
Calif., San Francisco—161 Missouri St. UN 1-7471
Colo., Denver—520 Acoma St. AM 6-1541
Mont., Billings—210 M & R Bldg. Phone 2-3941
N. Mex., Albuquerque—5206 Constitution Ave. Phone 6-0753
Ore., Portland—2809 N.E. 58th St. AT 8-5068
Utah, Salt Lake City—204 Dooly Bldg. Phone 4-6421
Wash., Seattle—511 Second Ave. W. AL 4884

PUNCH-LOK CO., 321 No. Justine St., Chicago 7, Ill.

Clamps (hose).

Branch Office
Calif., Piedmont—1554 Oakland Ave.
Representatives
Calif., Fresno—Valley Pipe & Supply Co., P.O. Box 551
Calif., Los Angeles—Howard Supply Co., 5125 Santa Fe Ave.
Calif., Oakland—Howard Supply Co., 61 Madison Ave.
Calif., San Francisco—Monarch Supply Co., 277 Pennsylvania Ave.
Colo., Denver—Union Supply Co., 5460 Colorado Blvd.
Ida., Wallace—Gardner Supply Co., 824 Bank St.
Mont., Butte—Butte Machinery Co., 510 E. Aluminum St.
N. Mex., Anthony—AAA Ammonia Service, Inc., P.O. Box 203
N. Mex., Carlsbad—Mine Supply Co., 402 So. Mine St.
Ore., Portland—Woodbury & Co., 5851 No. Lagoon-Swan Island, P.O. Box 3858
Utah, Salt Lake City—Mountain States Rubber Co., 121 Social Hall Ave.

QUINCY COMPRESSOR CO., 217 Maine St., Quincy, Ill.

Air compressors (portable, stationary).

Representatives
Ariz., Phoenix—Western Machinery Co., 820 No. 17th St. AL 3-4101
Calif., Los Angeles—Easick Manufacturing Co., 1950 Santa Fe Ave. MA 9-3341
Calif., Los Angeles—Sharpe Manufacturing Co., 1224 Wall St. RI 9-4368
Calif., San Francisco—Quincy Compressor West Coast Distributors, 1185 Mission St. UN 1-3030
Ore., Portland—Rogers Machinery Co., 5035 S.E. 17th Ave. FI 6478

RAMSEY CHAIN CO., INC., No. Broadway, Albany 4, N. Y.

Chains for drives (silent transmission), Couplings (shaft, flexible), Sprockets.

Representatives
Calif., Pasadena—Shaw Engineering Sales Co., 19 No. Catalina Ave., Rm. 217
Calif., South Gate—Power Transmission Equipment Co., 4501 Firestone Blvd.
Ore., Portland—Western Industrial Manufacturers Sales Co., 714 N.E. First Ave.

RANDALL-ROYLYN

RANDALL GRAPHITE BEARINGS, INC., Greenlawn and Lake St., P.O. Box 839, Lima, Ohio
Bearings (sleeve, bronze), Collars (shaft), Pillow blocks.

See advertisement on page 131

Branch Office
Calif., Santa Barbara—66 Rametto Rd. WO 9-0413

Representatives
Calif., Los Angeles—Edward D. Maltby Co., Inc., 1718 So. Flower St. RI 7-9191
Calif., San Francisco—Allan P. James Co., 430 Ninth St. MA 1-5994
Wash., Seattle—Bearing Engineering & Supply Co., 2548 Airport Way at Lander St.
Wash., Seattle—Brown Bearing Co., 2440 First Ave. So.

RAYBESTOS DIV., RAYBESTOS-MANHATTAN, INC., P.O. Box 1021, Bridgeport 2, Conn.

Clutch facings (molded, Ray-Lok, semi-metallic, full-metallic), Brakes, Woven roll lining, Molded roll lining, Brake blocks, Brake lining.

Branch Offices
Calif., Los Angeles—156 W. Adams Blvd. RI 7-6394
Calif., San Francisco—600 Fulton St. WA 1-4645
Colo., Denver—1153 Bannock St. AM 6-2306
Ore., Portland—1116 N.W. 17th Ave. CA 8-7529
Wash., Seattle—1525 Eleventh Ave. PR 9300

Representatives
Ariz., Tucson—T. E. Boyle, 2625 No. Eastgate Dr. Phone 5-1896
Calif., Glendora—W. E. Holley, 19302 E. Sierra Madre Ave. ED 5-2381
Calif., Mountain View—O. O. Oliver, 1654 Lee Dr. YO 7-5854
Calif., Norwalk—J. H. Miller, Jr., 11248 Pantheon St. TO 4-6883
Calif., Sun Valley—R. D. Albright, 8886 Morehart St. RO 7-2751
Colo., Denver—E. C. Faulds, 2937 So. Harrison. SK 6-2202
Ore., Eugene—R. P. Amann, 3005 Mill St. Phone 4-5065
Ore., Portland—F. V. Seely, 6448 S.W. 47th Pl. CH 4-8426

RAYBESTOS-MANHATTAN, INC., 61 Willet St., Passaic, N. J.

Belting, drive (composition, rubber), Belts, V (composition, rubber), Hose (air, flexible metallic, hydraulic).

Branch Offices
Calif., Los Angeles—4651 Pacific Blvd. LU 8-4254
Calif., San Francisco—131 Mission St. YU 6-6114
Colo., Denver—4500 York St. AC 2-8264
Ore., Portland—1220 S.W. Stark St. AT 4107
Wash., Seattle—2440 Sixth Ave. So. EL 6725

REEVES PULLEY CO. DIV., RELIANCE ELECTRIC & ENGINEERING CO., 1225 Seventh St., Columbus, Ind.

Bases (motor, adjustable), Vari-speed Moto drives, Vari-speed motor pulleys, Variable speed transmissions, Flexi-speed drives, Vari-spin drives.

Branch Offices
Calif., Burlingame—1525 Adrian Rd. OX 7-5341
Calif., Maywood—3652 E. Slauson Ave. LU 8-2196
Representatives
Colo., Denver—Hamilton Associates, 1236 Elati St. CH 4-1505
Ore., Portland—Pacific Coast Geared Products, Inc., 930 S.E. Oak St. VE 3177
Utah, Salt Lake City—Lundin & May Foundry Co., 454 W. Fifth No. Phone 9-2005
Wash., Seattle—Western Gear Works, 417 Ninth Ave. So. MA 0062

RELIANCE ELECTRIC & ENGINEERING CO., 1088 Ivanhoe Rd., Cleveland 10, Ohio (also see REEVES PULLEY CO. DIV.)

Controls (electric motor), Gearmotors, Totally-protected motors (AC), Super-T motors (DC), Motor generator sets, Adjustable-speed motors, Brake-motors, Variable-speed drives, Variable-speed transmissions.

See advertisement on page 68

Sales Offices
Ariz., Phoenix—H. & B. Engineering Sales Co., 21 East Durango
Calif., Los Angeles—5268 E. Washington Blvd. AN 8-0159
Calif., San Francisco—1525 Adrian Road. Burlingame, Calif. OX 7-5341
N. Mex., Albuquerque—Boyd Industrial Engineering, Inc., P. O. Box 598, 112 W. Granite St. Phone 3-2247
Ore., Portland—Shaffer & Nelson, 139 S.E. Taylor St. BE 4-7487
Utah, Salt Lake City—Clarence W. Silver Co., 550 W. 7th South St. EL 5-5378
Wash., Seattle—Shaffer & Nelson, 312 Occidental Ave. MU 0186
Wash., Spokane—Shaffer & Nelson, P. O. Box 198. FA 5395

RENCO-TOLEDO, INC., 3358 W. Alexis Rd., Toledo 13, Ohio

Controls (compressed air, hydraulic), Cylinders (air), Fittings and couplings (air), Motors (air), Valves (air power line).

Representative
Calif., Burbank—Roger Howell Co., 1804 W. Olive St. VI 9-1808

REPUBLIC STEEL CORP., STEEL & TUBES DIV., 224 E. 131st St., Cleveland 8, Ohio

Tubing, pressure (including boiler tubing, heat exchanger and condenser tubing), Tubing (electrical metallic), Conduits (rigid threaded).

Branch Offices
Calif., Los Angeles—2900 E. 44th St. LU 2-6276
Calif., San Francisco—Rialto Bldg. GA 1-0977
Colo., Denver—Continental Oil Bldg. MA 3-5289
Wash., Seattle—White-Henry-Stewart Bldg. MA 8583

Representatives
Colo., Denver—C. D. Belt & Co., 1921 Blake St. KE 4-1393 (for electrical products)
Wash., Seattle—Shaffer & Nelson Co., 312 Occidental Ave. MU 0186 (for electrical products)

REULAND ELECTRIC CO., 3001 W. Mission Rd., Alhambra, Calif. CU 3-4171

Electric motors, Grinders and buffers, Magnetic brakes, Motoreducers.

Branch Office
Calif., Oakland—1240 E. 12th St. KE 4-2233
Representatives
Ariz., Phoenix—Air-Draulics Co., 31 So. Third Ave. AL 4-4703
Ore., Portland—Chas. E. Klaus Co., 1004 S.E. Belmont St. EA 1189
Wash., Seattle—Chas. E. Klaus Co., 2605 Western Ave. SE 5520

RHODAS, J. E., & SONS, 2100 W. Eleventh St., Wilmington 99, Del.

Belting (leather), Belts (timing), Belts, V (leather), Packings (leather).

Representative
Ore., Portland—C. L. Koerner, 12200 S.E. Oatfield Rd. EV 1-8773

ROBBINS & MYERS, INC., 1345 Lagonda Ave., Springfield, Ohio

Generators (electric), Motors (electric, single phase, polyphase, DC, open-protected, totally-enclosed, and explosion-proof).

Representatives
Calif., Los Angeles—R. Meussdorffer, 8468 Melrose Pl. OL 3-4172
Calif., San Francisco—C. W. Boswell, 1139 Mission St. HE 1-3435
Colo., Denver—Howard Toneray, 1732 Blake St. CH 4-1102

ROBERTSHAW-FULTON CONTROLS CO., see FIELDEN INSTRUMENT DIV. and FULTON-SYLPHON DIV.

ROCKBESTOS PRODUCTS CORP., Nicoll and Canner Sts., New Haven 4, Conn.

Cables (high temperature, aircraft, hookup, coaxial), Wires and cables (cables, varnished-cambric, insulated, power, control, lighting).

Branch Offices
Calif., Los Angeles—4020 W. Third. DU 8-8879
Calif., Oakland—Oakland Municipal Airport, P.O. Box 8. SW 8-2955

ROCKWELL MANUFACTURING CO., 400 No. Lexington Ave., Pittsburgh 8, Pa.

Pumps (hydraulic power), Regulators (pressure), Transmission, variable speed, Valves (air power line, hydraulic power line, lubricated plug).

Branch Offices
Calif., Los Angeles—3136 E. 11th St. AN 1-6107
Calif., San Francisco—525 Market St. GA 1-0071
Colo., Denver—1421 Mile High Center Bldg. AM 6-0441
Wash., Seattle—119 W. Denny Way. GA 6446

ROLLWAY BEARING CO., INC., 541 Seymour St. So., Syracuse 4, N. Y. Bearings (roller).

Representatives
Calif., Los Angeles—Harold R. Swanton, Inc., 1706 So. Brand Ave. RI 9-5114
Calif., San Francisco—Harold R. Swanton, Inc., 458 Brannan St. SU 1-0972
Wash., Seattle—Harold R. Swanton, Inc., 2789 4th Ave. So. MU 3232

ROOTS-CONNERSVILLE BLOWER DIV., DRESSER INDUSTRIES, 900 W. Mount St., Connerville, Ind.

Blowers, Gas pumps (rotary, centrifugal), Vacuum pumps, Gas meters (industrial), Spiraxial compressors, Inert gas generators.

Branch Offices
Calif., San Francisco—1101 Hearst Bldg. DO 2-8352
Ore., Portland—12200 S.E. Oatfield Rd. OL 4-8773

Representatives
Ariz., Phoenix—Ken Smith Co., P.O. Box 6104. AL 8-0901
Calif., Los Angeles—Preferred Equipment Co., Inc., 8442 Jillion St. RA 3-6391
Colo., Denver—Bursan Sales, Inc., 4943 Colorado Blvd. FR 7-3727
Utah, Salt Lake City—The Lang Co., Inc., 287 W. First South St., P.O. Box 479. Ph. 3-5831

ROSS, J. O., ENGINEERING CORP., 444 Madison Ave., New York 22, N.Y.

Dryers, industrial air systems, ovens.

Branch Offices
Calif., Los Angeles—6417 Bandini Blvd. RA 3-5146
Wash., Seattle—823 Skinner Bldg. SE 7165

ROSS OPERATING VALVE CO., 120 E. Golden Gate Ave., Detroit 3, Mich.

Controls (compressed air), Valves (air line).

Representatives
Calif., Los Angeles—R. W. Atkinson Co., 3713 Santa Fe Ave. LU 8-5107
Calif., San Francisco—R. W. Atkinson Co., 655 Folsom St. YU 2-5188
Colo., Denver—Alta Engineering Co., 1988 Nome St. EM 6-3557
Ore., Portland—Hydraulic & Air Equipment Co., 2316 N.W. Savier St. CA 3295
Wash., Seattle—Hydraulic & Air Equipment Co., 2450 Sixth Ave. So. MU 1681

ROYLYN, INC., 1706 Standard Ave., Glendale 1, Calif. CI 2-1146

Fittings and couplings (air, hydraulic), "Quick" couplings (all-purpose industrial—both open and self-sealing types), Inserts (Wag locking), Hose-coupling assemblies, Valves (hydraulic).

See advertisement on page 64

Branch Office
Calif., San Francisco—595 Buckingham Way. Suite 226

Representatives
Calif., Fresno—Haehl Equipment Co., 1903 No. Highway 99
Calif., San Diego—Port M. Turner, 4966 Date St.
Calif., San Diego—Winn Supply, 256 Seventh
Calif., San Francisco—Gilmore Steel & Supply Co., 840 Brannan St.
Colo., Denver—Aviation Service Supply Co., Stapleton Airfield
Colo., Denver—Landes, Zachary & Peterson, 2500 W. 7th
Ore., Portland—Gilmore Steel & Supply Co., 6161 N.W. 61st St.
Ore., Portland—Goodyear Rubber & Asbestos Co., 205 N.W. Fifth Ave.
Utah, Salt Lake City—Mountain States Rubber Co., 121 Social Hall Ave.
Wash., Spokane—Towne Equipment Co., 622 No. Monroe St.

RUCKER—SNAP-TITE

RUCKER CO., THE, 4700 San Pablo Ave., Oakland 8, Calif. OL 3-5221
Test benches, Power units, Centrifuges, Drum filters, Control centers, Controls (compressed air, hydraulic), Cylinders (air, hydraulic), Testing instruments, Hydraulic power pumps, Valves (air power line, hydraulic power line).

Branch Offices
Calif., South Gate—4956 Firestone Blvd. LO 4-2521
Ore., Portland—911 N.W. Hoyt St. CA 3-0205
Wash., Seattle—1000 4th Ave. So. MA 2783

RUNDEL ELECTRIC CO., 230 Adrian Rd., Millbrae, Calif. OX 7-5500
Special electric control, distribution equipment, Switchgear.

Representative
Calif., Los Angeles—John Hyatt Co., 1709 W. 8th St. DU. 3-7428

SARCO CO., INC., Empire State Bldg., New York 1, N. Y.

Controls (compressed air, automatic temperature), Regulators (pressure), Traps (self-powered type and electric indicating type, steam), Strainers (pipe line).

Branch Office
Calif., San Francisco—35 Elmira St. JU 6-1917

Representatives
Ariz., Phoenix—A. C. Baechlin, P.O. Box 912, WH 5-6351
Calif., Los Angeles—T. H. Crears Corp., 5706 Airdrome St. WE 6-1141

Colo., Denver—Steam Engineering Service Co., 620 12th St. P.O. Box 5034 Terminal Annex, AC 2-4483

Mont., Billings—Leffer Engineering Sales, 108 No. 23rd St. P.O. Box 1142, Phone 2-2105

N. Mex., Albuquerque—Technical Service Co., 730 Haines Ave., N.W., P.O. Box 131, Phone 7-1508

Ore., Portland—R. H. Brown & Co., 5825 N.W. Front Ave. CA 7-1155

Utah, Salt Lake City—N. O. Nelson Co., 380 W. 2nd So. St. Phone 4-7846

Wash., Seattle—E. H. Norton, 909 Lloyd Bldg. MU 0483
Wash., Spokane—John L. Harvey Co., So. 121 Monroe St. MA 3002

SCHRADER'S SON, A., DIV., SCOVILL MFG. CO., INC., 470 Vanderbilt Ave., Brooklyn 38, N. Y.

Complete line of pneumatic valves, cylinders, and all components for pneumatic machine control.

Branch Office
Calif., Temple City—John R. Nelson, 6343 No. Trelawny

Representatives
Ariz., Phoenix—Ducommun Metals & Supply Co., 2625 E. Washington St.

Calif., Los Angeles—Union Hardware & Metals Co., 5555 Ferguson Drive

Calif., Los Angeles—Ducommun Metals & Supply Co., 4890 So. Alameda St.

Calif., San Francisco—C. W. Marwedel Co., 1235 Mission St. UN 1-2125

Calif., San Leandro—Republic Supply Co., 1919 William St. LO 2-0414 and EN 1-1060

Colo., Denver—Johnson Supply Co., 1123 Wazee St.

Ore., Portland—Russ Chamberlin Co., 234 S.E. 12th Ave.

Utah, Salt Lake City—Industrial Supply Co., Inc., 121-135 Social Hall Ave.

Wash., Seattle—Campbell Industrial Supply Co., 3433 Airport Way

SCHRAMM, INC., West Chester, Pa.

Air compressors (portable, stationary).

Branch Offices
Calif., Los Angeles—846 F. 6th St. TU 2431
Calif., San Francisco—1315 Howard St. UN 3-6655

Colo., Westminster—3983 W. 84th Ave., Shaw Heights, HA 9-2191

Ore., Portland—6915 S.W. 68th Ave. CH 4-8463

Representatives
Colo., Denver—H. W. Moore Equipment Co., 5990 Colorado Blvd. AT 8-0771

Mont., Helena—Montana Powder & Equipment Co., 12 E. Lawrence. HI 2-2990

Ore., Portland—Contractors Equipment Co., 2727 S.E. Union Ave. BE 5-4131

Wash., Spokane—General Machinery Co., E. 3500 Riverside Ave. KE 1535

SCOVILL MFG. CO., INC., see A. SCHRADER'S SON DIV.

SEATTLE BOILER WORKS, INC., 5237 E. Marginal Way, Seattle 4, Wash.
Boilers and boiler equipment, Generators (packaged-unit, steam).

SHAHER BEARING DIV., CHAIN BELT CO., 801 Burlington Ave., Downers Grove, Ill.

Cartridge units, Duplex units, Flange units, Pillow blocks, Take-up units, Take-up and frame units.

Branch Offices
Calif., Berkeley—2940 Seventh St. TH 3-6801
Calif., Los Angeles—7601 Telegraph Rd. RA 3-4751

Ore., Portland—2310 N.W. 24th Ave. CA 3-6121
Wash., Seattle—2425 Airport Way. MA 7051

Distributors
Ariz., Phoenix—Edward D. Maltby Co., 120 So. Fourth Ave., P.O. Box 1124

Ariz., Tucson—Tucson Bearing Co., 527 No. Stone Ave.

Calif., Bakersfield—R & F Bearing Co., Inc. Calif., Cloverdale—Klamath Machinery & Locomotive Works

Calif., El Centro—R & F Bearing Co., Inc. Calif., Eureka—Bearings & Transmission Products, 5th & B Sts.

Calif., Fresno—Valley Foundry & Machine Co., 2718 East Ave.

Calif., Long Beach—Bay City Bearing Co., 2138 American Ave.

Calif., Los Angeles—Bearing Sales Co., 1950 So. Olive St.

Calif., Los Angeles—Edward D. Maltby Co., Inc., 1718 So. Flower St.

Calif., Los Angeles—R & F Bearing Co., Inc., 325 W. 17th St.

Calif., Maywood—Edward D. Maltby Co., Inc., 4035 E. 52nd St.

Calif., Oakland—Bearing Engineering Co., 1019 Harrison St.

Calif., Pomona—Reliable Bearing & Supply Co., 246 So. Towne Ave.

Calif., Redding—Cascade Industrial Supply, Inc., Highway 99 South

Calif., San Bernardino—Reliable Bearing & Supply Co., 263 So. E St.

Calif., San Diego—Edward D. Maltby Co., Inc., 745 15th St.

Calif., San Diego—R & F Bearing Co., Inc., 256 Seventh Ave.

Calif., San Francisco—All Bearing Service, Inc., 456 Brannan St.

Calif., San Francisco—Bearing Engineering Co., 1547 Mission St.

Calif., San Francisco—Chas. A. Fowler Co., 979 Bryant St.

Calif., San Francisco—C. M. Lovsted & Co., 591 Howard St.

Calif., San Jose—Bearing & Equipment Co., 60 So. San Pedro St.

Calif., Santa Maria—The Bearing House, P. O. Box 932, Peco Rd.

Calif., Stockton—The Bearings Supply Co., 300 N. Wilson Way

Calif., Ukiah—Klamath Machinery & Locomotive Works, 720 No. State St.

Calif., Ventura—The Bearing House, 1252 No. Ventura Ave.

Colo., Denver—Bearing Service & Supply Co., 1850 Market St.

Colo., Denver—Colorado Bearing Co., 1601-11 Wazee St.

Colo., Denver—Union Bearing & Transmission Co., 1622 Wazee St.

Colo., Denver—Union Supply Co., 5460 Colorado Blvd.

Ida., Boise—Idaho Chain & Sprockets, Inc., 2400 Warm Springs Ave., P.O. Box 2648

Ida., Boise—Western Bearings, Inc., 520 Front St.

Ida., Lewiston—Jameson Machine & Supply Co., 855 D St.

Ida., Pocatello—Pocatello Chain & Sprocket, Inc., 701 So. First Ave.

Mont., Billings—Bearings Supply Co., 15 No. 31st St., P. O. Box 1391

Mont., Missoula—Power Transmission, Inc., 812 Toole Ave.

Ore., Portland—Bearing Sales & Service, 1645 N.W. Hoyt St.

Ore., Portland—General Tool Co., 325 N.W. 15th Ave.

Ore., Portland—Woodbury & Co., 133 S.W. 2nd Ave.

Ore., Roseburg—Bearing Sales & Service, 117 So. Stephens St.

Ore., Roseburg—Industrial Supply Co., 132 So. Stephens St.

Ore., Salem—Salem Steel & Supply Co., 180 Court St.

Utah, Salt Lake City—Bearings Engineering & Sales Co., 756 So. Second St. W.

Utah, Salt Lake City—Bearing Service & Supply, 1207 So. Main St.

Wash., Everett—Bearing Sales & Service, Inc., 2803 Grand Ave.

Wash., Longview—Bearing Sales & Service, Inc., 2741 Fourth Ave. So.

Wash., Seattle—Bearing Sales & Service, Inc., 2906 Sixth Ave. So.

Wash., Seattle—C. M. Lovsted & Co., Inc., 4000 W. Marginal Way

Wash., Spokane—General Machinery Co., E. 3500 Block, Riverside Ave.

Wash., Tacoma—Bearing Sales & Service, Inc., 1718 Pacific Ave.

SIMPLEX ENGINEERING CO., Newark Rd., Zanesville, Ohio

Hydraulic high pressure pumps and valves.

Representatives
Calif., Glendale—Haskel Engineering & Supply Co., 1236 So. Central. CH 5-6811

Calif., Millbrae—Haskel Engineering & Supply Co., 305 Adrian Rd.

Colo., Denver—Iver J. Esbenson Co., 1725 E. 17th Ave. EA 2-7733

Ore., Portland—Haskel Engineering & Supply Co., 222 N.W. 10th Ave.

Wash., Seattle—Haskel Engineering & Supply Co., 1016 First Ave.

S K F INDUSTRIES, INC., Front St. & Erie Ave., Philadelphia 32, Pa.

Bearings (ball, roller), Pillow blocks.

Branch Offices
Calif., Los Angeles—3131 So. Hill St. RI 9-3168

Calif., San Francisco—790 Tennessee St. MI 8-4625

Colo., Denver—1420 18th St. MA 3-3924

Ore., Portland—1625 N.W. Hoyt St. CA 8-4309

Wash., Seattle—170 Denny Way. SE 4454

Distributors
Authorized distributors in principal cities.

SKINNER ELECTRIC VALVE DIV., 95 Edgewood Ave., New Britain, Conn.

Stainless steel solenoid valves (for air, water, oil, steam, vacuum and many other media).

Representatives
Calif., Van Nuys—Western Control Equipment Co., 14615 Ventura Blvd. ST 9-2300

Colo., Denver—Automatic Control & Equipment Co., 1925 Blake St. AC 2-9528

Ore., Portland—Hydraulic & Air Equipment Co., 2316 N.W. Savier. CA 2-3295

Distributors
Calif., Glendale—Haskel Engineering & Supply, 1236 So. Central. CH 5-3167

Calif., Oakland—Rucker Co., 4700 San Pablo. OL 3-5221

Calif., San Francisco—California Instrument Co., 351 10th Ave. UN 3-0350

SMITH, A. O., CORP., Electric Motor Div., 531 No. Fourth St., Tipp City, Ohio

Gearmotors, Motors (electric, poly-phase and single-phase AC).

Branch Offices
Calif., Los Angeles—1632 No. Spring St. CA 1-6131

Calif., Oakland—505 66th Ave. LO 9-8994

Representatives
Ore., Grants Pass—Electric Motor Shop, 1725 Williams Secondary

Ore., Portland—Polich & Durkin, 734 N.W. Glisan St. CA 8-2671

Wash., Seattle—H. M. Denny Co., 1016 1st Ave. So. EL 5960

SNAP-TITE, INC., 201 Titusville Road, Union City, Pa.

Hydraulic couplings and fittings for aircraft missiles, Quick connect and disconnect couplings, Special couplings, Valves.

Representatives
Calif., Oakland—The Vickery Co., 670 16th St. GL 1-1160

Colo., Denver—Alta Engineering Co., 1988 Nome St. EM 6-3557

Hawaii, Honolulu—Arthur H. deRocher Co., Ltd., P.O. Box 617

Utah, Salt Lake City—C. H. Spencer & Co., 210 W. 33rd St. So. IN 6-8683

SORGEL—TURLOCK

SORGEL ELECTRIC CO., 838 W. National Ave., Milwaukee 4, Wis.
Electrical transformers, Unit substations, Load centers.

Representatives
Calif., Los Angeles—H. D. Easterbrook, 1264 So. Boyle Ave. AN 9-9421
Calif., San Diego—James A. Setchell, 301 W. G St. BE 3-3981
Calif., San Francisco—Campbell & George, 1601 Cortland Ave. MI 8-1236
Colo., Denver—Floyd H. Boyer, P. O. Box 1751, AL 5-6770
Ore., Portland—Fred W. Carlson & Associates, 935 N.W. 12th Ave., Rm. 133. CA 8-3798
Wash., Seattle—Fred W. Carlson, 1201 Dexter Ave. EL 6630

SPERRY PRODUCTS, INC., Shelter Rock Rd., Danbury, Conn.
Instruments (measuring and testing).

Branch Office
Calif., Los Angeles—5258 E. Washington Blvd. AN 8-7722

SPLIT BALLBEARING CORP., 211 Mechanic St., Lebanon, N. H.
Bearings (ball).

Representatives
Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St. RI 7-9191
Calif., San Francisco—George M. Philpott Co., 1060 Bryant St. HE 1-5475

SQUARE D CO., 4335 Valley Blvd., Los Angeles 32, Calif.

Circuit breakers, Control centers, Controls (compressed air, electric, electric motor, hydraulic), Ducts (bus and wiring), Load centers, Panelboards (electric), Switches (automatic, electric), Switchgear equipment.

Branch Offices
Calif., Sacramento—1331 T St. GI 2-8332
Calif., San Bernardino—7495 Buena Vista. YU 2-2687
Calif., San Diego—Rm. 604, California Theatre Bldg. BE 3-7621
Calif., San Francisco—211 Industrial St. JU 7-4590
Colo., Denver—710 W. Colfax. KE 4-6266
Ore., Portland—711 S.E. Ankeny St. BE 4-8488
Wash., Seattle—830 Corwin Place. CA 1474
Wash., Spokane—W. 915 Mallon. BR 1444

Representatives
Ariz., Phoenix—Sun Valley Mfg., 106 E. Buchanan AL 8-6448
Calif., Fresno—Electric Equipment Co., 561 Divisadero. Phone 3-6614
Hawaii, Honolulu—A. E. Linzer, 1079 Noio. Phone 7-6317
Utah, Salt Lake City—Stevens Sales Co., 1482 Major St. IN 7-5489

SQUARE D CO., EC&M DIV., 4500 Lee Road, Cleveland 28, Ohio
Controls (electric, electric motor).

Branch Offices
Calif., Los Angeles—6066 E. Olympic Blvd. RA 3-4121
Calif., San Francisco (San Carlos)—530 El Camino Real. LY 1-0754
Wash., Seattle—830 Corwin Pl. CA 1474

Representatives
Colo., Denver—H. C. Guire Co., 715 So. York St. SP 7-2564
Utah, Salt Lake City—Riter Engineering Co., Kearns Bldg. Phone 3-7933

STANDARD PRESSED STEEL CO., P.O. Box 333, Jenkintown, Pa.

Collars (shaft), Pillow blocks.
Branch Office
Calif., El Segundo—815 No. Sepulveda Blvd. Phone 1655

STEPHENS-ADAMSON MFG. CO., 85 Ridgeway Ave., Aurora, Ill.

Bearings (ball), Conveying, elevating, screening, crushing and power transmission equipment (coal handling and bulk materials handling equipment), Pillow blocks, Reducers, speed (helical gear).

Branch Offices
Calif., Los Angeles—2227 E. 37th St. LU 3-1511
Calif., San Francisco—145 Mission St. EX 2-7181

Representatives
Colo., Denver—E. N. Murray, 609 Equitable Bldg.
Ore., Portland—P. R. Hines, 1007 E. Burnside St.
Utah, Salt Lake City—C. H. Spencer & Co., 210 W. 33rd St.
Wash., Seattle—D. A. Lyons, 714 Joseph Vance Bldg.

STERLING ELECTRIC MOTORS, INC., 5401 Telegraph Rd., Los Angeles 22, Calif. RA 3-6211

Electric motors, Geared motors, Speed reducers, Variable speed transmissions.

Branch Offices
Calif., San Francisco—383 Brannan St. SU 1-7997
Ore., Portland—738 Glisan St. CA 8-4656
Wash., Seattle—1712 First Ave. So. SE 0723

Representatives
Colo., Denver—James R. Hughes, 5460 Colorado Blvd. AL 5-2091
Utah, Salt Lake City—W. H. Pingree, 461 E. 2nd South St. EM 3-6782

TALLER & COOPER, INC., 75 Front St., Brooklyn, N. Y.

Control and data reduction equipment.

See advertisement on page 74

Representatives
Calif., Los Angeles—F. Somers Peterson, 1501 Maple Ave. RI 9-6151
Calif., San Francisco—F. Somers Peterson, 157 13th St. MA 1-2255

THERMOID CO., Trenton, N. J.

Belted, drive (rubber), Belts, V (rubber), Clutches (faces), Hose (air, hydraulic).

Branch Offices
Calif., Los Angeles—1100 So. Santa Fe Ave. TR 8603
Calif., San Francisco—544 Second St. YU 2-4141
Ore., Portland—3939 N.W. St. Helen's Rd. CA 9765
Utah, Nephi—Phone 424W

THOMAS FLEXIBLE COUPLING CO., Main Ave. and Biddle St., Warren, Pa.

Couplings (flexible, for mechanical power transmission).

Representatives
Calif., Los Angeles—W. A. Hoppe & Co., 3640 W. 62nd St. AX 3-6072
Calif., San Francisco—Brooks Equipment Co., 636 Potrero Ave. VA 4-8223
Colo., Denver—Stearns-Roger Manufacturing Co., 660 Bannock St. AC 2-8484
Wash., Seattle—Seattle Equipment & Supply, Inc., 4020 Airport Way. MA 3569

THOR POWER TOOL CO., 175 No. State St., Aurora, Ill.

Belted, drive (rubber), Hose (air), Motors (air, electric), Tools (portable air, electric).

Branch Offices
Calif., Los Angeles—6200 E. Slauson Ave. RA 3-3191
Calif., San Francisco—315 So. Van Ness Ave. UN 1-2045
Colo., Denver—2704 W. 8th Ave. AL 5-3668
Wash., Seattle—611 E. Pike St. CA 5000

TIMKEN ROLLER BEARING CO., THE, 1835 Dueber Ave. S.W., Canton 6, Ohio

Tapered roller bearings.

Branch Offices
Calif., Los Angeles—2727 So. Flower St. RI 7-4141
Calif., San Francisco—1452 Bush St. OR 3-6521
Colo., Denver—2140 E. 45th Ave. AM 60275
Wash., Seattle—305 Ninth Ave. No. MA 1550

TITEFLEX, INC., Hendee St., Springfield 4, Mass.

Hose (flexible metallic).

Representatives
Calif., Glendale—Haskel Engineering & Supply Co., 1236 So. Central Ave.
Calif., Los Angeles—J. F. Dixon Co., 1835 So. Hope St. RI 9-4161
Calif., San Francisco—Adam Hill Co., 244 9th St.
Wash., Seattle—A. F. Woolsey Co., 84 Madison St.

TON-TEX CORP., 247 Pearl St., N. W. Grand Rapids 2, Mich.

Belted (power transmission), V-Belt segments (flat and adjustable).

Branch Office
Calif., San Jose—759 W. San Carlos. CY 3-3230

TORRINGTON CO., THE, Field St., Torrington, Conn.

Bearings (roller, thrust).

Branch Offices
Calif., Los Angeles—4433 Crenshaw Blvd.
Wash., Seattle—1731 First Ave. So.

Representatives
Ariz., Phoenix—Edward D. Maltby Co., 424 W. Jefferson
Calif., Fresno—Geo. M. Philpott Co., 2376 Railroad St.
Calif., Los Angeles—Bearing Sales Co., 1950 So. Olive St.
Calif., Los Angeles—Edward D. Maltby Co., 1718 So. Flower St.
Calif., Oakland—Bearing Industries, Inc., 165 Tenth St.
Calif., Sacramento—Geo. M. Philpott Co., 6260 Folsom Blvd.
Calif., San Diego—Edward D. Maltby Co., 745 15th St.
Calif., San Francisco—All Bearing Service, 456 Brannan St.
Calif., San Francisco—Bearing Industries, Inc., 266 Bayshore Blvd.
Calif., San Francisco—Charles A. Fowler Co., 979 Bryant St.
Calif., San Francisco—Geo. M. Philpott Co., 1060 Bryant St.
Colo., Denver—Colorado Bearing Co., 1618 Wazee St.
Ida., Lewiston—Jameson Machine Supply Co., 829 D St.
Mont., Billings—Power Transmission Equipment Co., 20 No. 33rd St.
Nev., Reno—Styris-Sutton Co., 622 So. Virginia St.
N. Mex., Albuquerque—Montezuma Bearing Service, 1413 No. First St.
Ore., Portland—Bearing Sales & Service, Inc., 1645 N.W. Hoyt St.
Ore., Portland—Geo. M. Philpott Co., 2355 N.W. 21st Ave.
Utah, Salt Lake City—Bearing Engineering & Sales Co., 756 So. Second W.
Wash., Seattle—All Bearing Service, Inc., 2741 Fourth Ave. So.
Wash., Seattle—Bearing Sales & Service, Inc., 2908 Sixth Ave. So.
Wash., Tacoma—Bearing Sales & Service, Inc., 1718 Pacific Ave.

TRIANGLE CONDUIT & CABLE CO., INC., P.O. Box 711, New Brunswick, N. J.

Copper tube, Plastic pipe, Wire and cable (electric).

Branch Offices
Calif., Los Angeles—6466 Fleet St. RA 3-3687
Colo., Denver—2526 So. Cherry St. SK 6-5354
Wash., Seattle—1201 Fourth Ave. So. MU 3971

TRU-SEAL DIV., FLICK-REEDY CORP., see MILLER FLUID POWER DIV.

TURLOCK IRON & MACHINE WORKS, P.O. Box 609, Turlock, Calif.

Cylinders (air, hydraulic).

Representatives
Calif., Stockton—Grether & Grether, P.O. Box 47. HO 2-4124
Calif., Whittier—Grether & Grether, P.O. Box 1036. OX 7-7812

TWIN DISC CLUTCH CO., 1234

Racine St., Racine, Wis.

Clutches, fluid couplings, friction and fluid drives for industrial applications, gears (reverse and reduction), power take-offs, torque converters.

Branch Office

Calif., Los Angeles—2950 Leonis Blvd. LO 8-3309

Representatives

Calif., Bakersfield—California Truck & Industrial Equipment Co., 2810 Brundage Lane
Calif., Huntington Park—N. A. D'Arcy Co., 7555 Marbliss St., P.O. Box 447
Calif., Los Angeles—Charles W. Carter Co., 2950 Leonis Blvd.
Calif., Sacramento—California Equipment Co., 2231 Fourth St.
Calif., San Francisco—California Equipment Co., 660 Bryant St.
Calif., San Francisco—Charles A. Fowler Co., 979 Bryant St.
Colo., Denver—Industrial Equipment Co., 4999 Jackson St.
Ore., Eugene—Mill-Log Equipment Co., 1355 Railroad Blvd.
Ore., Portland—Hydra-Lines, Inc., 511 S.E. Market St.
Ore., Portland—Power Transmission Products, 1107 N.W. 14th Ave.

UNION CHAIN & MFG. CO., Edge-water Ave., Sandusky, Ohio

Belting, chains (roller, silent transmission, engineering, drive and conveying), couplings (chain type), sprockets.

Branch Office

Ore., Portland—208 S.W. Stark St. CA 8-9211

Representatives

Ariz., Phoenix—Arizona Conv. & Equipment Co., 610 W. Jefferson
Calif., Long Beach—Kings Parts & Service, 2801 Cherry Ave.
Calif., Los Angeles—American Chain & Gear, 2451 E. 57th, LU 1-7215
Calif., San Francisco—Charles A. Fowler Co., 899 Bryant St. UN 3-5010
Calif., Stockton—Stockton Iron Works, Harrison and Lindsay Sts. HO 6-7091
Colo., Denver—Power Transmission, Inc., 4965 Jackson St. DU 8-1681
Ida., Boise—Western Bearings, Inc., 520 Front St. Phone 2-5583
Ida., Idaho Falls—Ideal Hardware Co.
Mo., Great Falls—Brack Motor Supply Co., 104-106 First Ave. Phone 4-4346
Mont., Missoula—Power Transmission, Inc., 802 Toole Ave. Phone 9-4188
N. Mex., Carlsbad—Union Industrial Corp., 112 E. Mermod. TU 5-2187
Ore., Eugene—Munnell & Sherrill, Inc., 1450 W. 7th St. Phone 4-3287
Ore., Portland—Munnell & Sherrill, Inc., 400 S.W. First Ave. CA 8-7365
Utah, Salt Lake City—Kimball Equipment Co., 222 W. 17th, So. Phone 84-6109
Utah, Salt Lake City—Lundin & May Foundry, 454 W. 5th St. No. Phone 9-2005
Wash., Longview—Longview Equipment Co.
Wash., Seattle—Bearing Engineering & Supply, 2548 Airport Way. MA 2744

U. S. ELECTRONIC MOTORS, INC., 200 E. Slauson Ave., Los Angeles 54, Calif.

Gearmotors, increasers (speed), motors (electrical, for general industrial and agricultural use), reducers, speed (bevel gear, helical gear, worm gear), transmission, variable speed.

Branch Offices

Ariz., Phoenix—1002 W. Weldon Ave. AL 8-2693
Calif., Bakersfield—1817 H St. FA 3-7369
Calif., Fresno—155 Van Ness Ave. Phone 6-0689
Calif., Sacramento—719 K St. HU 1-2517
Calif., San Francisco—564 Fourth St. GA 1-7626
Calif., San Jose—442 Park Ave. CY 3-8580
Utah, Salt Lake City—Rm. 212, Beason Bldg., P.O. Box 27, EM 3-3903
Wash., Seattle—3427 4th Ave., So. SE 0614

UNITED STATES GAUGE DIV., AMERICAN MACHINE & METALS, INC., Sellersville, Pa.

Instruments (measuring and testing).

Branch Office

Calif., Los Angeles—11973 San Vicente Blvd. GR 2-9584

Representatives

Calif., Berkeley—J. S. Page Co., 570 Coventry Rd. LA 4-5517
Calif., Los Angeles—W. R. Ladewig Co., 5608 E. Washington Blvd. RA 3-6371

Colo., Denver—E. P. Cook Co., 1863 Wazee St. KE 4-2371
Wash., Seattle—Instrument Laboratory, 934 Elliott Ave. W. AL 5850

U. S. HOFFMAN MACHINERY CORP., 103 Fourth Ave., New York 3, N. Y.

Centrifugal blowers and exhausters, vacuum cleaning equipment (stationary and portable), metal strip drivers, industrial filtration and clarification equipment for machine tools, etc. (all types), Ordnance equipment.

Representatives

Ariz., Phoenix—H & B Engineering Sales Co., 21 E. Durango St. AL 8-1300
Calif., Los Angeles—Lombard Smith Co., 714 W. Olympic Blvd. RI 8-5345
Calif., Oakland—John H. Schmidt, McArthur Blvd.
Colo., Denver—Patten Engineering Co., 1745 Blake St. TA 5-3545
N. Mex., Albuquerque—Boyd Industrial Engineering, 112 W. Granite Ave. Phone 3-2247
Texas, El Paso—Boyd Industrial Engineering, 609 Laurel St. Phone 3-7575 (covers parts of N. Mex.).
Wash., Seattle—R. E. Chase & Co., 414 Times Square Bldg. SE 2377
Wash., Spokane—R. E. Chase & Co., 501 Hyde Bldg. MA 9052
Wash., Tacoma—R. E. Chase & Co., P.O. Box 1414, 2332 E. 11th St. MA 4281

UNITED STATES RUBBER CO., 1230 Avenue of the Americas, New York 20, N. Y.

Batteries, belts (timing), belts, V (rubber), fittings and couplings (air, hydraulic), hose (air, hydraulic), pulleys, wire and cable (electric).

Branch Offices

Ariz., Phoenix—1140 No. 22nd Ave.
Calif., Los Angeles—Soto & E. 46th Sts.
Calif., San Francisco—6025 Third St.
Colo., Denver—4800 Colorado Blvd.
Ore., Portland—630 N.W. Tenth Ave.
Utah, Salt Lake City—160 Social Hall Ave.
Wash., Seattle—220 Jackson St.
Wash., Spokane—105 Howard St.

UNIVERSAL METAL HOSE CO., 2133 So. Kedzie Ave., Chicago 23, Ill.

Hose (flexible metallic).

Representatives

Calif., Los Angeles—Guy L. Warden & Sons, 209 W. 12th St. RI 7-0541
Calif., San Francisco—Calpacific Equipment Co., 50 Hawthorne St. GA 1-0697

VICTOR BALATA & TEXTILE BELTING CO., 53 Park Place, New York 7, N. Y.

Belting, drive (Balata, canvas stitched, Hycar, Neoprene, solid woven), lacing (belt).

Representatives

Calif., So. Pasadena—T. H. Hinchcliffe, P.O. Box 221
Ore., Portland—S. Alex Turnley, 4433 N.E. Failing St.

WADSWORTH ELECTRIC MFG. CO., THE, Covington, Ky.

Circuit breakers, controls (electric), load centers, panelboards (electric), service equipment, switches (electric, safety), wiring troughs.

Representatives

Calif., Los Angeles—Rutkin Electric Sales Co., 937 Stanford Ave. TU 1224
Calif., San Francisco—Hodges & Glomb, Inc., 921 Bryant St. UN 1-2367
Colo., Denver—L. S. Reed & Co., 1018 Lawrence St. CH 2416
Ore., Portland—Bruce-Emmett Co., 830 S.E. Alder St. EA 3117
Wash., Seattle—Bruce-Emmett Co., 1016 First Ave. So. EL 5007

WAGNER ELECTRIC CORP., 6400 Plymouth Ave., St. Louis 14, Mo.

Motors, Transformers.

Branch Offices

Calif., El Segundo—610 Lairport. OR 8-7671
Calif., So. San Francisco—219 Shaw Rd. PL 6-0520
Colo., Denver—1526 Blake St. CH 4-7421
Ore., Portland—3460 N.W. Industrial St. CA 7-3654
Utah, Salt Lake City—165 So. 1st W. EM 3-5013

TWIN DISC—WEBSTER

WARD LEONARD ELECTRIC CO., 115 MacQuesten Parkway So., Mount Vernon, N. Y.

Controls (electric, electric motor).

Branch Office

Calif., Los Angeles—1605 E. Olympic Blvd. MA 9-3595

Representatives

Ariz., Tucson—Central Station Equipment Co., 2323 Aviation Highway. Phone 3-2493
Calif., San Francisco—L. F. Church Co., 750 Natoma St. UN 1-2840
Colo., Denver—Mark G. Mueller, 1644 Blake St. AC 2-3515
Ore., Portland—Northwestern Agencies, Inc., 2941 N.W. Quimby. BR 5004
Utah, Salt Lake City—Leonard M. Slusser, 318 Dooly Bldg. Phone 5-2322
Wash., Seattle—Northwestern Agencies, Inc., 4130 First Ave. So. EL 8882

Distributors

Ariz., Phoenix—Arizona Wholesale Electric Co., 200 So. First
Ariz., Tucson—Hussar Electric Supply Co., 103 No. Park Ave.
Calif., San Francisco—Coast Pipe & Supply Co., 479 Bayshore Blvd.
Calif., San Francisco—Nadon Engineering & Sales Co., 7 Front St.
Calif., San Francisco—Rundel Electric Co., 634 Sixth St.
Colo., Denver—M. L. Foss, Inc., 19th & Arapahoe Sts.
Ida., Pocatello—Steel Industrial Supply, Paul Roberts Div., P.O. Box 1151
Wash., Seattle—Fremont Electric Co., 744 No. 34th St.

WARNER ELECTRIC BRAKE & CLUTCH CO., Beloit, Wis.

Brakes (electric), Clutches.

Branch Office

Calif., Pasadena—R. Whitson, 116 So. Euclid Ave., Suite 101. SY 2-6713

Representatives

Calif., Los Angeles—Engineering Products Co., 1600 So. San Pedro St. RI 9-7044
Calif., San Leandro—P. J. Burrill Co., 2131 Washington Ave. SW 8-3165
Ore., Portland—J. F. Taraba Co., 1824 S.E. 50th Ave. BE 4-6491
Utah, Salt Lake City—Clarence W. Silver Co., 550 W. 7th St. So. Phone 5-5378
Wash., Seattle—Caskey Engineering Co., 1736 First Ave. So. MA 4073

WEATHERHEAD CO., THE, FORT WAYNE DIV., 128 W. Washington Blvd., Fort Wayne, Ind.

Automotive and industrial fittings, hydraulic hose and fittings, Ermeto flareless couplings, reusable hose ends, clamp type hose ends, swaged hose assemblies, drain and shut-off cocks, dash controls.

Branch Offices

Calif., Glendale—1736 Standard Ave. CH 5-1891
Calif., San Francisco—4333 Irving St. LO 4-2078
Calif., Woodland Hills—21237 Lopez St. DI 7-2681

Representatives

Calif., Huntington Park—Mahi Steel & Supply Co., 3081 E. Slauson Ave.
Calif., Los Angeles—Republic Supply Co., 2600 So. Eastland Ave.
Calif., Pasadena—Jay H. Collin Co., 2403 E. Washington St.
Calif., San Francisco—Adam-Hill Co., 244 Ninth St.
Ore., Portland—Goodyear Rubber & Asbestos Co., 205 N.W. 5th Ave.
Ore., Portland—Hydraulic & Air Equipment Co., 2316 N.W. Savier St.
Wash., Seattle—Tubessupply Co., 2453 6th Ave. South

WEBSTER MANUFACTURING, INC., 1200 W. Davis St., Tiffin, Ohio

Chains (malleable, steel), collars (shaft), conveyors for bulk materials, couplings (shaft), pillow blocks, sheaves, sprockets.

Representatives

Calif., Los Angeles—Manufacturers Engineering Co., 1720 W. 9th St.
Ore., Portland—Power Transmission Products, 1107 N.W. 14th Ave.
Wash., Seattle—Washington Belting & Rubber Co., 2763 1st Ave. So.

WESTERN GEAR—ZIDELL

WESTERN GEAR CORP., 2600 E. Imperial Highway, P.O. Box 182, Lynwood, Calif. NE 6-2161

Electrical equipment, Geomotors, Gears (special machinery of all types and sizes), High speed units, Increasers (speed), Motors (air, electric, hydraulic, variable speed), Reducers, speed (bevel gear, helical gear, planetary gear, shaft mounted, spur gear, worm gear), Transformers (rotary), Transmission, variable speed.

See advertisement inside back cover

Branch Offices

Calif., Belmont—Quarry and Industrial Rd. LY 3-7611
Calif., Pasadena—131 W. Colorado Blvd. RY 1-6604
Calif., San Francisco—1035 Folsom St. HE 1-6521
Colo., Denver—865 Lincoln St. KE 4-5513
Ore., Portland—930 S.E. Oak St. VE 3177
Wash., Seattle—417 9th Ave. So. MA 0062

WESTERN INSULATED WIRE CO., 2425 E. 30th, Los Angeles 58, Calif.
Cable (Type W & G, control, asbestos), Cords (Type SO power, portable).

See advertisement on page 30

Representatives

Calif., San Francisco—Michael Curry, 2624 26th Ave. LO 4-5730
N. Mex., Albuquerque—John Carder, 1624 No. 1st St. Phone 2-3581
Wash., Seattle—J. H. Stumph, 1000 4th Ave. So. MU 5232

WESTINGHOUSE AIR BRAKE CO., INDUSTRIAL PRODUCTS DIV., P.O. Box 36, Wilmerding, Pa.

Controls (compressed air), Cylinders (air, hydraulic), Fittings and couplings (air), Hose (air), Regulators (pressure), Valves (air power line).

Branch Offices

Calif., Los Angeles—469 Pacific Electric Bldg., 610 So. Main St. MI 9719
Calif., San Francisco—501 Matson Bldg., 215 Market St. EX 2-1790

Representatives

Ariz., Phoenix—Air-Draulics Co., 31 So. Third Ave.
Calif., Bakersfield—Lawless Brothers, Inc., 4000 Rosedale Highway, P.O. Box 3036
Calif., Eureka—Bearings & Transmission Products, P.O. Box 879, 2930 Broadway
Calif., Fresno—Lawless Brothers, Inc., 2537 Church Ave.
Calif., Long Beach—Marine Industrial Supply, 645 W. Anaheim St.
Calif., Long Beach—Smith & Thorp, Ltd., 141 E. Anaheim St.
Calif., Los Angeles—Huddleston Equipment Co., 1148 So. Los Angeles St.
Calif., San Diego—Equipment Engineering Co., 1470 India St.
Calif., San Francisco—Power-Mac Corp., 467 So. Van Ness Ave.
Calif., San Pedro—Bolstad Sales & Service, 124 E. 4th St.
Calif., Stockton—Geiger Iron Works, Inc., Scotts Ave. and Pilgrim St.
Colo., Denver—Landes, Zachary & Peterson Co., 2500 W. 7th Ave.
Hawaii, Honolulu—Napa Hawaiian Warehouse, 747 Ianiwai St.
Ore., Medford—Cal-Ore Machinery Co., Inc., 944 So. Central
Ore., Portland—Hallidie Machinery Co., Portland Div., 1545 S.E. Union Ave.
Utah, Salt Lake City—Robert Taylor & Sons, 1077 So. Main St., P.O. Box 1223
Wash., Seattle—Evans Engine & Equipment Co., 1230 Westlake No.
Wash., Seattle—Hallidie Machinery Co., 210 Hudson St.
Wash., Spokane—Equipment Sales & Service, 925 First Ave.
Wyo., Casper—Gehring Equipment Co., 1701 E. Yellowstone, P.O. Box 2290

WESTERN INDUSTRY, 609 Mission St., San Francisco 5, Calif.

Specialized information on industrial power problems for Western plant operating executives.

WESTINGHOUSE ELECTRIC CORP., P.O. Box 868, Pittsburgh 3, Pa.

Circuit breakers, Control centers, Controls (electric, electric motor), Ducts (bus and wiring), Fluid drives, Geomotors, Gears (bevel, helical, spur, etc.), Gears (worm), Generators (electric), Instruments (measuring and testing), Load centers, Motors (electric, single-phase and poly-phase AC), Panelboards (electric), Rectifiers, Speed reducers, Substations (unit), Switchgear equipment, Transformers.

Branch Offices

Ariz., Phoenix—1110 No. 21st Ave.
Calif., Bakersfield—1210 18th St.
Calif., Emeryville—5815 Peladeau St.
Calif., Fresno—2608 California Ave.
Calif., Long Beach—2129 Pacific Ave.
Calif., Los Angeles—600 St. Paul Ave.
Calif., Riverside—3830 8th St.
Calif., Sacramento—1720 14th St.
Calif., San Diego—525 E St.
Calif., San Francisco—410 Bush St.
Colo., Denver—910 Fifteenth St.
Ida., Boise—318 So. Capitol Blvd.
Mont., Butte—1 E. Broadway
N. Mex., Albuquerque—1115 Central Ave., N.E.
Ore., Eugene—62 W. 13th Ave.
Ore., Medford—1233 Court St.
Ore., Portland—309 S.W. Sixth St.
Texas, El Paso—611 Electric Bldg.
Utah, Salt Lake City—235 W.S. Temple St.
Wash., Seattle—3451 E. Marginal Way
Wash., Spokane—No. 1023 Monroe St.
Wash., Tacoma—1024 W. R. Rust Bldg.
Wash., Walla Walla—202 Denny Bldg.

WESTON ELECTRICAL INSTRUMENT CORP., subsidiary of DAYSTROM, INC., 614 Frelinghuysen Ave., Newark 5, N. J.

Controls (electric), Instruments (measuring and testing), Regulators (pressure).

Branch Office

Calif., Los Angeles—2001 So. Grand Ave.
Representatives
Calif., San Francisco—H. E. Held, 147 10th St.
Colo., Denver—Peterson Co., 4949 Colorado Blvd.
Wash., Seattle—Eicher & Co., 5 W. Harrison St.

WHITNEY CHAIN CO., 237 Hamilton St., Hartford 2, Conn.

Finished steel roller chains, Conveyor chains, Silent chains, Sprockets and flexible couplings for power transmission and conveying.

Branch Office

Calif., Huntington Park—5400 Pacific Blvd. LU 7-3151

Representatives

Calif., Alturas—Moty & Van Dyke, Inc.
Calif., Anaheim—P & L Transmission, Inc., 327 So. Los Angeles St.
Calif., Bakersfield—Bakersfield Bearing & Motor Supply Co., 2000 H St.
Calif., Brawley—Shank & Kretz Machine & Auto Parts, 141 No. 5th St.
Calif., Corcoran—Sawtelle & Rosprim, P.O. Box 938
Calif., Culver City—Aircraft & Industrial Bearings, Inc., 5541 Washington Blvd.
Calif., Eureka—Bearings & Transmission Products, Inc., 2930 Broadway
Calif., Fresno—General Bearings Co., P.O. Box 3220
Calif., Gardena—Brandphart Bearings, Inc., 16508 So. Vermont Ave.
Calif., Long Beach—Bay City Bearing Co., Inc., 709 W. Sixteenth St.
Calif., Marysville—Bearing Belt Chain Co., 823 Fifth St.
Calif., Maywood—Bay City Bearing Co., Inc., 5275 Atlantic Blvd.
Calif., No. Sacramento—Industrial Parts Supply, Inc., 920 Del Paso Blvd.
Calif., Oakland—Bearing Engineering Co., 1019 Harrison St.
Calif., Patterson—W. C. Filippini Machine Shop, 2nd and I Sts.
Calif., Pomona—Kelley Supply Co., 254 No. Main St.
Calif., Redding—Moty & Van Dyke, Inc., Highway 99 So.
Calif., Riverside—Belt & Equipment Supply Co., 2351 8th St.
Calif., San Francisco—Bearing Engineering Co., 1547 Mission St.
Calif., San Gabriel—Valley Cities Supply Co., 845 E. Valley Blvd.
Calif., Santa Maria—The Bearing House of Santa Maria, Pescio Rd., P.O. Box 932
Calif., Stockton—The Bearing Supply Co., 300 No. Wilson Way
Calif., Van Nuys—So-Cal Equipment & Supply Co., 7227 Van Nuys Blvd.
Calif., Ventura—The Bearing House, 1252 No. Ventura Ave.

WORTHINGTON CORP., 401 Worthington Ave., Harrison, N. J.

Air compressors (portable, stationary), Belts, V (vulcanizer), Condensers (barometric, surface steam), Exciters (steam-jet air), Engines, Feedwater heaters, Gears (bevel, helical, spur, etc.), Generators (electric), Increasers (speed), Pumps, power (horizontal and vertical), Pumps (condensate, boiler feed), Reducers, speed (helical gear), Sheaves, Transmission, variable speed.

Branch Offices

Calif., Los Angeles—5075 Santa Fe Ave. LO 8-6451
Calif., San Francisco—224 Townsend St. GA 1-4906
Colo., Denver—1640 Blake St. TA 5-7284
Utah, Salt Lake City—118 Social Hall Ave. EM 4-6591
Wash., Seattle—2916 Western Ave. MA 4211

Representatives

(District offices and representatives in all principal cities).

W-S FITTINGS DIV., H. K. PORTER CO., INC., P.O. Box 95, Roselle, N. J.
Forged steel fittings (carbon, stainless, alloy).

Branch Office

Calif., Fullerton—12141 Lovell Pl. LA 6-2072
Okla., Tulsa—P.O. Box 4073, LU 2-5538

Representatives

Sold through leading distributors everywhere.

YORK-SHIPLEY, INC., 75 Jessop Place, York, Pa.

Boilers and boiler equipment, Fuel burning systems, Burners (power, rotary), Generators (power, steam).

Representatives

Ariz., Phoenix—Crane Co., 233 So. First Ave. AL 3-5136
Calif., Torrance—The A. C. Co., 2093 Torrance Blvd. Phone 238
Ore., Portland—Copenhagen & Co., 406 Builders Exchange, FI 6071
Wash., Seattle—Jenkins Engineering Co., 2426 Commodore Way, AD 7852
Wash., Spokane—Francis J. Fallquist, 180 So. Washington St. MA 5514

YUBA MANUFACTURING CO., 351 California St., San Francisco 4, Calif.
Chains for drives (detachable link, roller), Pulleys, Sheaves, Sprockets.

See advertisement on page 142

Branch Office

Calif., Benicia—701 East H St. Phone 628

Representatives

Ariz., Phoenix—Allison Steel Mfg. Co., 19th Ave. So. Pacific Tracks
Ariz., Phoenix—Arizona Cedar Rapids Co., 1726 W. Jackson St.
Calif., Alhambra—Frank Cox Equipment Co., 3000 W. Valley Blvd.
Calif., Los Angeles—Brown-Bovis Industrial Equipment Co., 4441 Santa Fe Ave.
Calif., Oakland—Bay Cities Equipment Co., 2792 Cypress
Calif., Oakland—The Brose Co., 414 Santa Clara
Ida., Boise—Idaho Sprocket & Machine Works, 2400 Warm Springs Ave.
Ida., Pocatello—Pocatello Chain & Sprocket, P. O. Box 50
Mont., Butte—Hall-Perry Equipment, P. O. Box 1367
Mont., Missoula—Westmont Tractor Co., 1150 E. Spruce St.
Nev., Reno—Sierra Machinery Co., 307 Morrill Ave.
N. Mex., Albuquerque—Lively Equipment Co., 2601 4th St. N.W.
Ore., Portland—Nelson Equipment Co., 5251 S.E. McLaughlin Blvd.
Tex., El Paso—Lively Equipment Co., 1708 E. Bassett St.
Utah, Salt Lake City—Kimball Equipment Co., 222 W. 17th South
Wash., Seattle—Jack Sahlberg Equipment, 5950 4th Ave. So.

ZIDELL MACHINERY & SUPPLY CO., 3121 S.W. Moody St., Portland 1, Ore. CA 8-8691

Electric drives (DC, variable speed), Electric motor works.

Representatives (Variable speed drives only)
Market. Phone 532

Mont., Missoula—Miller Machinery, P.O. Box 1496, Phone 9-2309
Ore., Portland—R. Hoe & Co., 2700 S.E. Tacoma. BE 4-9501

CLASSIFIED PRODUCTS SECTION

If you are searching for a particular type of industrial power product, look here under proper heading to determine names of manufacturers of that item—then refer to listings in "Where-to-Buy Section" to obtain name, address, and telephone number of manufacturer's branch office, distributor, or representative nearest you.

AIR COMPRESSORS—

portable

American Brake Shoe Co.
American Brake Shoe Co.,
Kellogg Div.
The Bellows Co. of California
Binks Manufacturing Co.
The Cornelius Co.
Curtis Manufacturing Co.
Chicago Pneumatic Tool Co.
Davy Compressor Co.
The DeVilbiss Co.
Ingersoll-Rand Co.
Joy Manufacturing Co.
Leden Manufacturing Co.
Quincy Compressor Co.
Rust-Connersville Blower Div.,
Dresser Industries, Inc.
Schramm, Inc.
Worthington Corp.

AIR COMPRESSORS—

stationary

Allis-Chalmers Mfg. Co.
American Brake Shoe Co.
American Brake Shoe Co.,
Kellogg Div.
The Bellows Co. of California
Binks Manufacturing Co.
Brunner Manufacturing Co.
Chicago Pneumatic Tool Co.
Curtis Manufacturing Co.
Davy Compressor Co.
The DeVilbiss Co.
Fuller Co.
Ingersoll-Rand Co.
Joy Manufacturing Co.
Leden Manufacturing Co.
Quincy Compressor Co.
Schramm, Inc.
Worthington Corp.

AIR CYLINDERS

See CYLINDERS, air

AIR MOTORS

See MOTORS, air

BASES—motor

Allis-Chalmers Mfg. Co.
American Brake Shoe Co.
American Pulley Co.
Gerbing Manufacturing Corp.
Link-Belt Co.
The Louis Allis Co.
Leveray Flexible Coupling Co.
The Master Electric Co.
Philadelphia Gear Works, Inc.
Reeves Pulley Co. Div., Reliance
Electric & Engrg. Co. (adjustable)

BATTERIES

C & D Batteries, Inc.
Delco-Remy Div., General Motors Corp.
The Electric Storage Battery Co.
The E. F. Goodrich Co.
Gould-National Batteries, Inc.
Hobbs Battery Sales Div., Gould-National Batteries, Inc.
United States Rubber Co.

BEARINGS—babbitted

American Brake Shoe Co.
Charles Bond Co.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
The Jeffrey Mfg. Co.
Johnson Bronze Co.
Link-Belt Co.

BEARINGS—ball

Aetna Ball & Roller Bearing Co.
Ahlberg Bearing Co.
Boston Gear Works
Dodge Manufacturing Corp.

The Fafnir Bearing Co.
Hartford Steel Ball Co., Inc.
Link-Belt Co.
Marlin-Rockwell Corp.
Miniature Precision Bearings, Inc.
New Departure Div., General Motors Corp.
New Hampshire Ball Bearings, Inc.
Niece Ball Bearing Co.
S K F Industries, Inc.
Split Ballbearing Corp.
Stephens-Adamson Mfg. Co.

BEARINGS—roller

Aetna Ball & Roller Bearing Co.
Chain Belt Co.
Cooper Split Roller Bearing Corp.
Dodge Manufacturing Corp.
Link-Belt Co.
Marlin-Rockwell Corp.
Rollway Bearing Co., Inc.
S K F Industries, Inc.
Shafer Bearing Div., Chain Belt Co.
The Timken Roller Bearing Co.
The Torrington Co. (also thrust)

BEARINGS—sleeve

American Brake Shoe Co.
Ampco Metal, Inc.
Amplex Div., Chrysler Corp. (also flange and thrust)
Dodge Manufacturing Corp.
Johnson Bronze Co.
Kingwell Bros., Ltd.
Link-Belt Co.
Randall Graphite Bearings, Inc.

BELTING, DRIVE—chain

or link

H. N. Cook Belting Co.
R. & J. Dick Co., Inc.
Graton & Knight Co.
Link-Belt Co.
Manheim Mfg. & Belting Co. (link only)
Union Chain & Mfg. Co.

BELTING, DRIVE—

composition

California Belting & Leather Co.
H. N. Cook Belting Co.
R. & J. Dick Co., Inc.
The Gates Rubber Co.
Raybestos-Manhattan, Inc.
Ton-Tex Corp.
Victor Balata & Textile Belting Co.

BELTING, DRIVE—leather

Charles Bond Co.
California Belting & Leather Co.
Chicago Belting Div., Chicago-Allis Mfg. Corp.
H. N. Cook Belting Co.
L. F. Degen Belting Co.
The Gates Rubber Co.
Graton & Knight Co.
E. F. Houghton & Co.
J. E. Rhoads & Sons
Ton-Tex Corp.

BELTING, DRIVE—rubber

American Pulley Co.
The American Rubber Mfg. Co.
California Belting & Leather Co.
The Dayton Rubber Co., (V-type)
Durkee-Atwood Co.
The Gates Rubber Co.
Goodall Rubber Co.
Hewitt-Robins, Inc.
Link-Belt Co.
New York Belting & Packing Co.
Raybestos-Manhattan, Inc.
Thermoid Co.
Thor Power Tool Co.
Ton-Tex Corp.

BELT LACING

See LACING, belt

BELTS—timing

R. & J. Dick Co., Inc.
Link-Belt Co.
New York Belting & Packing Co.
J. E. Rhoads & Sons
United States Rubber Co.

BELTS, V—composition

Durkee-Atwood Co.
The Gates Rubber Co.
The Haultain-Champion Co., Inc.
Raybestos-Manhattan, Inc.
Ton-Tex Corp.

BELTS, V—leather

California Belting & Leather Co.
H. N. Cook Belting Co.
The Gates Rubber Co.
Graton & Knight Co.
J. E. Rhoads & Sons
Ton-Tex Corp.

BELTS, V—rubber

Allis-Chalmers Mfg. Co.
American Pulley Co.
California Belting & Leather Co.
The Dayton Rubber Co.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
Durkee-Atwood Co.
Fort Worth Steel & Machinery Co.
The Gates Rubber Co.
Goodall Rubber Co.
The B F. Goodrich Co.
The Haultain-Champion Co., Inc.
Link-Belt Co.
Manheim Mfg. & Belting Co.
New York Belting & Packing Co.
Raybestos-Manhattan, Inc.
Thermoid Co.
United States Rubber Co.
Worthington Corp.

BOILERS & BOILER

EQUIPMENT

The Babcock & Wilcox Co.
Boiler Engineering & Supply Co., Inc.
Wm. Bros. Boiler & Mfg. Co.
Clayton Manufacturing Co.
Cleaver-Brooks Co.
Combustion Engineering, Inc.
Copes-Vulcan Div., Blaw-Knox Co.
Foster Wheeler Corp.
Fulton Syphon Div., Robertshaw-Fulton Controls Co. (equipment only)
Orr & Semberower, Inc.
Sid E. Parker Boiler Mfg. Co., Inc. (equipment only)
Republic Steel Corp., Steel & Tubes Div. (tubes)
Seattle Boiler Works, Inc.
York-Shipley, Inc.

BRAKES—electric

Warner Electric Brake & Clutch Co.

BUS DUCTS

See DUCTS

CABLE

See WIRE & CABLE

CHAINS FOR DRIVES—

detachable link

Acme Chain Corp.
Chain Belt Co.
Diamond Chain Co., Inc.
The Jeffrey Mfg. Co.
Link-Belt Co.
Philadelphia Gear Works, Inc.
Yuba Manufacturing Co.

CHAINS FOR DRIVES—

roller

Acme Chain Corp.
Atlas Chain & Mfg. Co.
Charles Bond Co.
Boston Gear Works
Chain Belt Co.
Cullman Wheel Co.
Diamond Chain Co., Inc.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
Fort Worth Steel & Machinery Co.
The Jeffrey Mfg. Co.
Link-Belt Co.
Morse Chain Co.
Philadelphia Gear Works, Inc.
Union Chain & Mfg. Co.
Whitney Chain Co.
Yuba Manufacturing Co.

CHAINS FOR DRIVES—

silent transmission

Acme Chain Corp.
Chain Belt Co.
Link-Belt Co.
Morse Chain Co.
Philadelphia Gear Works, Inc.
Ramsey Chain Co., Inc.
Union Chain & Mfg. Co.
Whitney Chain Co.

CHAINS FOR DRIVES—

other

Acme Chain Corp.
Chain Belt Co.
Link-Belt Co. (steel, cast)
Webster Manufacturing, Inc. (malleable and steel)
Whitney Chain Co.

CIRCUIT BREAKERS

Allis-Chalmers Mfg. Co.
Appleton Electric Co.
Bull Dog Electric Products Co.
Cutler-Hammer, Inc.
Federal Pacific Electric Co.
General Electric Co.
Apparatus Sales Div.
General Electric Co.,
Circuit Protective Devices Dept.
I-T-E Circuit Breaker Co.
Square D Co.
The Wadsworth Electric Mfg. Co., Inc.
Westinghouse Electric Corp.

CLUTCHES

American Flexible Coupling Div.,
Zurn Industries, Inc.
Cutler-Hammer, Inc.
Dodge Manufacturing Corp.
Eaton Manufacturing Co.,
Dynamatic Div.
Formspag Co.
The Hilliard Corp.
I-T-E Circuit Breaker Co.
The Jeffrey Mfg. Co.
Leden Manufacturing Co.
Link-Belt Co.
Mercury Clutch Div.,
Automatic Steel Products, Inc.
Morse Chain Co.
Raybestos Div., Raybestos-Manhattan, Inc. (facings)
Thermoid Co. (facings)
Twin Disc Clutch Co.
Warner Electric Brake & Clutch Co.

COLLARS—shaft

American Pulley Co.
Boston Gear Works
Chain Belt Co.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
Gear Engineering & Mfg. Co., Inc.
Link-Belt Co.
Randall Graphite Bearings, Inc.
Standard Pressed Steel Co.
Webster Manufacturing, Inc.

COMPRESSORS

See AIR COMPRESSORS

CONDUITS & FITTINGS—

electric

Appleton Electric Co.
Buchanan Electrical Products Corp.
Columbia Cable & Electric Corp. (electric metallic tubing)

CONTROL CENTERS — GENERATORS

General Electric Co., Construction Materials Div. (conduits only)
Johns-Manville Corp.
National Electric Products Corp.
Republic Steel Corp., Steel & Tubes Div.
Triangle Conduit & Cable Co., Inc. (steel, plastic)

CONTROL CENTERS

Allen-Bradley Co.
Allis-Chalmers Mfg. Co.
The Clark Controller Co.
Cutler-Hammer, Inc.
Federal Pacific Electric Co.
Fischer & Porter Co.
General Electric Co.
Apparatus Sales Div.
Industrial Control Panel Co.
Leeds & Northrup Co.
The Rucker Co.
Rundel Electric Co.
Square D Co.
Taller & Cooper, Inc.
Westinghouse Electric Corp.

CONTROLS — compressed

air

Bailey Meter Co.
Cleveland Fuel Equipment Co.
The Emerson Manufacturing Co.
Fielden Instrument Div.,
Robertshaw-Fulton Controls Co.
Fischer & Porter Co.
The Foxboro Co.
Fulton Sylphon Div.,
Robertshaw-Fulton Controls Co.
Furnas Electric Co.
General Controls Co.
Hanna Engineering Works
Jordan Corp.
Lecden Manufacturing Co.
Logansport Machine Co., Inc.
Mason-Neilan, Div. of Worthington Corp.
The Mercoid Corp.
Modernair Corp.
The Powers Regulator Co.
Renco-Toledo, Inc.
Ross Operating Valve Co.
The Rucker Co.
Sarco Co., Inc.
A. Schrader's Son Div., Scovill Mfg. Square D Co.
Westinghouse Air Brake Co., Industrial Products Div.

CONTROLS — electric

Allen-Bradley Co.
Allis-Chalmers Mfg. Co.
Automatic Switch Co.
The Clark Controller Co.
Cleveland Fuel Equipment Co.
Counter & Control Corp.
(circuit controlling counters)
Cutler-Hammer, Inc.
Fielden Instrument Div.,
Robertshaw-Fulton Controls Co.
Fischer & Porter Co.
The Foxboro Co.
Furnas Electric Co.
General Control Co., Inc.
General Controls Co.
General Electric Co., Apparatus Sales Div.
Guardian Electric Mfg. Co.
Leeds & Northrup Co.
The Mercoid Corp.
The Powers Regulator Co.
Rundel Electric Co.
Square D Co.
Square D Co., EC&M Div.
Taller & Cooper, Inc.
The Wadsworth Electric Mfg. Co., Inc.
Ward Leonard Electric Co.
Westinghouse Electric Corp.
Weston Electrical Instrument Corp., subsidiary of Daystrom, Inc.

CONTROLS — electric motor

Allen-Bradley Co.
Allis-Chalmers Mfg. Co.
Bogue Electric Mfg. Co.
The Clark Controller Co.
Cutler-Hammer, Inc.
Federal Pacific Electric Co.
Fischer & Porter Co.
Furnas Electric Co.
General Control Co., Inc.
General Controls Co.
General Electric Co., Apparatus Sales Div.
Guardian Electric Mfg. Co.
The Louis Allis Co.
Philadelphia Gear Works, Inc.
The Powers Regulator Co.

Reliance Electric & Engineering Co.
Square D Co.
Square D Co., EC&M Div.
Taller & Cooper, Inc.
Ward Leonard Electric Co.
Westinghouse Electric Corp.

CONTROLS — hydraulic

Char-Lynn Co.
The Commercial Shearing & Stamping Co.
The Denison Engineering Co.
Fischer & Porter Co.
Fulton Sylphon Div., Robertshaw-Fulton Controls Co.
General Controls Co.
Hanna Engineering Works
Hydraulic Power Div., Hydraulic Press Mfg. Co., a Div. of Koehring Co.
Jordan Corp.
Lecden Manufacturing Co.
Leslie Co.
Logansport Machine Co., Inc.
Modernair Corp.
The New York Air Brake Co., Kalamazoo Div.
The Oilgear Co.
The Powers Regulator Co.
Renco-Toledo, Inc.
The Rucker Co.
Simplex Engineering Co.
Square D Co.
Taller & Cooper, Inc.

COUPLINGS — air and hydraulic

See FITTINGS & COUPLINGS

COUPLINGS — shaft

American Flexible Coupling Div., Zurn Industries, Inc.
Atlas Chain & Mfg. Co.
Charles Bond Co.
Boston Gear Works
David Brown, Inc.
Chain Belt Co.
Char-Lynn Co.
Cullman Wheel Co.
Diamond Chain Co., Inc.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
The Emerson Manufacturing Co.
The Falk Corp.
Foote Bros. Gear & Machine Corp.
Gerbing Manufacturing Corp.
Graton & Knight Co. (flexible)
The Haultain-Champion Co., Inc.
Hewitt-Robins, Inc.
The Jeffrey Mfg. Co.
Lecden Manufacturing Co.
Link-Belt Co.
Lowjoy Flexible Coupling Co. (flexible and shaft)
Morse Chain Co.
Philadelphia Gear Works, Inc.
Ramsey Chain Co., Inc.
Thomas Flexible Coupling Co.
Webster Manufacturing, Inc.
Whitney Chain Co. (flexible)

CYLINDERS — air

Airmatic Valve, Inc.
American Brake Shoe Co.
The Bellows Co. of California
The Bruning Co.
Cascade Manufacturing Co.
Curtis Manufacturing Co.
Densmore Engineering Co., Inc.
The Foxboro Co.
Galland-Henning, Nopak Div.
Grover Smith Mfg. Corp.
Hanna Engineering Works
Hannifin Corp.
Hydraulic Power Div., Hydraulic Press Mfg. Co., a Div. of Koehring Co.
Lecden Manufacturing Co.
Logansport Machine Co., Inc.
Miller Fluid Power Div., Flick-Reedy Corp.
Modernair Corp.
C. A. Norgren Co.
Renco-Toledo, Inc.
The Rucker Co.
A. Schrader's Son Div., Scovill Mfg. Co.
Turlock Iron & Machine Works
Westinghouse Air Brake Co., Industrial Products Div.

CYLINDERS — hydraulic

Airmatic Valve, Inc.
American Brake Shoe Co.
The Bellows Co. of California
The Bruning Co.
Cascade Manufacturing Co.

Char-Lyn Co.
The Commercial Shearing & Stamping Co.
The Denison Engineering Co.
Densmore Engineering Co., Inc.
Galland-Henning, Nopak Div.
Hanna Engineering Works
Hannifin Corp.
Hydraulic Power Div., Hydraulic Press Mfg. Co., a Div. of Koehring Co.
Lecden Manufacturing Co.
Logansport Machine Co., Inc.
Miller Fluid Power Div., Flick-Reedy Corp.
Modernair Corp.
The New York Air Brake Co., Kalamazoo Div.
The Oilgear Co.
The Rucker Co.
Turlock Iron & Machine Works
Westinghouse Air Brake Co., Industrial Products Div.

DRIVES, VARIABLE SPEED

See TRANSMISSION, VARIABLE SPEED, & MOTORS, variable speed

DUCTS — bus and wiring

Bull Dog Electric Products Co.
Federal Pacific Electric Co.
Feedrol Corp.
I-T-E Circuit Breaker Co.
National Electric Products Corp.
Square D Co.
The Wadsworth Electric Mfg. Co., Inc. (wiring troughs)
Westinghouse Electric Corp.

ELECTRIC MOTORS

See MOTORS, electric

ENGINES

Allis-Chalmers Mfg. Co.
Chicago Pneumatic Tool Co. (diesel, gas, dual-fuel)
The Emerson Manufacturing Co.
Enterprise Engine & Machinery Co.
Fairbanks, Morse & Co. (gas, diesel)
Ingersoll-Rand Co. (diesel & gas)
Worthington Corp.

FITTINGS & COUPLINGS —

air

Aero-Coupling Corp.
The Aero Equipment Corp.
The Bruning Co.
Char-Lynn Co.
Chikan Co.
Crane Co.
Densmore Engineering Co., Inc.
Eastman Pacific Co.
Flex-O-Tube, Div. of Meridan Corp.
The Gates Rubber Co.
Goodall Rubber Co.
Grover Smith Mfg. Corp.
The Hansen Mfg. Co.
The Imperial Brass Mfg. Co.
Lincoln Engineering Co. of California
C. A. Norgren Co. (air line filters)
Punch-Lok Co. (hose clamps)
Renco-Toledo, Inc.
Roylyn, Inc.
A. Schrader's Son Div., Scovill Mfg. Co.
Snap-Tite, Inc.
U. S. Hoffman Machinery Corp.
United States Rubber Co.
Westinghouse Air Brake Co., Industrial Products Div.

FITTINGS & COUPLINGS —

hydraulic

Aero-Coupling Corp.
The Bruning Co.
Char-Lynn Co.
Chikan Co.
Crane Co.
Densmore Engineering Co., Inc.
Eastman Pacific Co.
Flex-O-Tube, Div. of Meridan Corp.
The Gates Rubber Co.
Goodall Rubber Co.
Grover Smith Mfg. Corp.
The Hansen Mfg. Co.
The Imperial Brass Mfg. Co.
Lincoln Engineering Co. of California
Punch-Lok Co. (hose clamps)
Roylyn, Inc.
Snap-Tite, Inc.
United States Rubber Co.
W-S Fittings Div., H. K. Porter Co., Inc.
The Weatherhead Co., Fort Wayne Div.

FLAT BELTS

See BELTING, DRIVE

FLEXIBLE SHAFTING

Elliott Mfg. Co.

FLUID DRIVES

Dodge Manufacturing Corp.
Link-Belt Co.
The Oilgear Co.
Twin Disc Clutch Co.
Westinghouse Electric Corp.

FUSES

Bussmann Manufacturing Co.
Economy Fuse & Mfg. Co.
General Electric Co., Apparatus Sales Div.

GEARMOTORS

Allis-Chalmers Mfg. Co.
Boston Gear Works
David Brown, Inc.
Century Electric Co.
Fairbanks, Morse & Co.
The Falk Corp.
Foote Bros. Gear & Machine Corp.
Franklin Electric Co., Inc.
General Electric Co., Apparatus Sales Div.
Link-Belt Co.
The Louis Allis Co.
The Master Electric Co.
Philadelphia Gear Works, Inc.
Reliance Electric & Engineering Co.
Reuland Electric Co.
A. O. Smith Corp., Electric Motor Div.
Sterling Electric Motors, Inc.
Western Gear Corp.
Westinghouse Electric Corp.

GEARS — bevel, helical, spur, etc.

Advance Gear & Machine Corp.
American Stock Gear Div., Perfection Gear Co.
Amplex Div., Chrysler Corp.
Associated Gear & Machine Co. (rack miter, internal spline serration)
Charles Bond Co.
Boston Gear Works
David Brown, Inc.
Cullman Wheel Co. (spur only)
The Falk Corp. (helical only)
Foote Bros. Gear & Machine Corp.
Gear Engineering & Mfg. Co., Inc.
Hewitt-Robins, Inc.
Johnson Gear & Mfg. Co., Ltd. (gear drives)
Link-Belt Co. (and gear units)
Lufkin Foundry & Machine Co. (also herringbone)
J. W. Minder Chain & Gear Co.
Philadelphia Gear Works, Inc.
Twin Disc Clutch Co.
Western Gear Corp.
Westinghouse Corp.
Worthington Corp.

GEARS — worm

Advance Gear & Machine Corp.
American Stock Gear Div., Perfection Gear Co.
Ameco Metal, Inc.
Associated Gear & Machine Co.
Charles Bond Co.
Boston Gear Works
David Brown, Inc.
The Cleveland Worm & Gear Co.
Foote Bros. Gear & Machine Corp.
Gear Engineering & Mfg. Co., Inc.
Hewitt-Robins, Inc.
Johnson Gear & Mfg. Co., Ltd.
J. W. Minder Chain & Gear Co.
Philadelphia Gear Works, Inc.
Western Gear Corp.
Westinghouse Electric Corp.

GENERATORS — electric

Allis-Chalmers Mfg. Co.
Bogue Electric Mfg. Co.
Century Electric Co.
Continental Electric Co., Inc.
Delco Products Div., General Motors Corp.
Delco-Remy Div., General Motors Corp. (automotive)
Enterprise Engine & Machinery Co.
Fairbanks, Morse & Co. (gasoline diesel)

F. J. Galland & Co.
General Electric Co., Apparatus
Sales Div.
Howard Industries, Inc.
Kurz & Root Co.
The Leland Electric Co. Div.,
American Machine & Foundry
Co.
Motor Generator Corp., Hobart
Brothers affiliate
Reliance Electric & Engineering Co.
Robbins & Myers, Inc.
Westinghouse Electric Corp.
Worthington Corp.

HANGERS—shaft

Boston Gear Works
Link-Belt Co.

HOSE—air

Aero-Coupling Corp.
The American Rubber Mfg. Co.
The Bellows Co. of California
Binks Manufacturing Co.
Chicago Pneumatic Tool Co.
Davy Compressor Co.
The DeVilbiss Co.
Eastman Pacific Co.
Flexonics Corp.
Flex-O-Tube, Div. of Meridan Corp.
The Gates Rubber Co.
Goodall Rubber Co.
The B. F. Goodrich Co.
Grover Smith Mfg. Co.
The Hansen Mfg. Co.
Hewitt-Robbins, Inc.
The Imperial Brass Mfg. Co.
Johnson Metal Hose, Inc.
Lincoln Engineering Co. of
California
New York Belting & Packing Co.
Raybestos-Manhattan, Inc.
A. Schrader's Son Div., Scovill
Mfg. Co.
Snap-Tite, Inc.
Thermoid Co.
Thor Power Tool Co.
United States Rubber Co.
The Weatherhead Corp., Fort Wayne
Div.
Westinghouse Air Brake Co.,
Industrial Products Div.

HOSE—flexible metallic

Columbia Cable & Electric Corp.
Flexonics Corp.
The Gates Rubber Co.
Goodall Rubber Co.
Hewitt-Robbins, Inc.
Johnson Metal Hose, Inc.
Raybestos-Manhattan, Inc.
Snap-Tite, Inc.
Tieflex, Inc.
Universal Metal Hose Co.

HOSE—hydraulic

Aero-Coupling Corp.
The American Rubber Mfg. Co.
The Bruning Co.
Eastman Pacific Co.
Flexonics Corp.
Flex-O-Tube, Div. of Meridan Corp.
The Gates Rubber Co.
Goodall Rubber Co.
The B. F. Goodrich Co.
Grover Smith Mfg. Corp.
Hewitt-Robbins, Inc.
The Imperial Brass Mfg. Co.
Joy Manufacturing Co.
Lincoln Engineering Co. of
California
New York Belting & Packing Co.
Raybestos-Manhattan, Inc.
Snap-Tite, Inc.
Thermoid Co.
United States Rubber Co.
The Weatherhead Corp., Fort
Wayne Div.

HYDRAULIC CYLINDERS

See CYLINDERS, hydraulic

HYDRAULIC MOTORS

See MOTORS, hydraulic

INCREASERS—speed

The Falk Corp.
Foot Bros. Gear & Machine Corp.
Hewitt-Robbins, Inc.
Link-Belt Co.
Lufkin Foundry & Machine Co.
U. S. Electrical Motors, Inc.
Western Gear Corp.
Worthington Corp.

INSTRUMENTS

measuring and testing

Bailey Meter Co.
Arnold O. Beckman, Inc.
Cleveland Fuel Equipment Co.
Counter & Control Corp. (circuit
controlling counters)
W. C. Dillon & Co., Inc.
Fielden Instrument Div.,
Robertshaw-Fulton Controls Co.
Fischer & Porter Co.
The Foxboro Co.
Fulton Syphon Div.,
Robertshaw Fulton Controls Co.
General Controls Co.
General Electric Co., Apparatus
Sales Div.
Leeds & Northrup Co.
Manning, Maxwell & Moore, Inc.
The Powers Regulator Co.
Roots-Connorsville Blower Div.,
Dresser Industries, Inc.
The Rucker Co.
Sperry Products, Inc.
Taller & Cooper, Inc.
United States Gauge Div.,
American Machine & Metals, Inc.
Westinghouse Electric Corp.
Weston Electrical Instrument Corp.,
subsidiary of Daystrom, Inc.

LACING—belt

Clipper Belt Lacer Co. (equipment)
Graton & Knight Co.
Victor Balata & Textile Belting Co.

LOAD CENTERS

Federal Pacific Electric Co.
General Electric Co., Apparatus
Sales Div.
Kuhlman Electric Co.
Leeds & Northrup Co.
Sorgel Electric Co.
Square D Co.
Westinghouse Electric Corp.

MOTOR BASES

See BASES, MOTORS

MOTOR CONTROLS

See CONTROLS, electric, motor

MOTORS—air

The Aro Equipment Corp.
The Bellows Co. of California
Binks Manufacturing Co.
Chicago Pneumatic Tool Co.
Densmore Engineering Co., Inc.
General Controls Co.
Grover Smith Mfg. Corp.
Ingersoll-Rand Co.
Joy Manufacturing Co.
Ledeen Manufacturing Co.
Leiman Bros., Inc.
Link-Belt Co. (gear)
Modernair Corp.
Renco-Toledo, Inc.
Thor Power Tool Co.
U. S. Hoffman Machinery Corp.

MOTORS—electric, DC

Allis-Chalmers Mfg. Co.
Baldor Electric Co.
Bogue Electric Mfg. Co.
Century Electric Co.
Continental Electrical Co., Inc.
Delco-Remy Div., General Motors
Corp. (starting)
Diehl Manufacturing Co.
Doerr Electric Corp.
Fairbanks, Morse & Co.
Franklin Electric Co., Inc.
General Electric Co., Apparatus
Sales Div.
Kurz & Root Co.
The Leland Electric Co., Div. of
American Machine & Foundry
Co.
The Louis Allis Co.
The Master Electric Co.
The Peerless Electric Co.
Reliance Electric & Engineering Co.
Robbins & Myers, Inc.
Thor Power Tool Co.
Westinghouse Electric Corp.

MOTORS—electric, poly-phase, AC

Allis-Chalmers Mfg. Co.
Baldor Electric Co.
Century Electric Co.
Continental Electric Co., Inc.

Delco Products Div., General
Motors Corp.
Diehl Manufacturing Co.
Doerr Electric Corp.
Fairbanks, Morse & Co.
Franklin Electric Co., Inc.
General Electric Co., Apparatus
Sales Div.
Kurz & Root Co.
The Leland Electric Co., Div. of
American Machine & Foundry
Co.
The Lima Electric Motor Co.
The Louis Allis Co.
The Master Electric Co.
The Peerless Electric Co.
Reliance Electric & Engineering Co.
Reuland Electric Co.
Robbins & Myers, Inc.
A. O. Smith Corp., Electric Motor
Div.
Sterling Electric Motors, Inc.
Thor Power Tool Co.
U. S. Electrical Motors, Inc.
Wagner Electric Corp.
Westinghouse Electric Corp.

MOTORS—electric, single-phase, AC

Baldor Electric Co.
Century Electric Co.
Delco Products Div., General
Motors Corp.
Diehl Manufacturing Co.
Doerr Electric Corp.
Fairbanks, Morse & Co.
Franklin Electric Co., Inc.
General Electric Co., Apparatus
Sales Div.
Kurz & Root Co.
The Leland Electric Co., Div. of
American Machine & Foundry
Co.
The Lima Electric Motor Co.
The Louis Allis Co.
The Master Electric Co.
The Peerless Electric Co.
Reuland Electric Co.
Robbins & Myers, Inc.
A. O. Smith Corp., Electric Motor
Div.
U. S. Electrical Motors, Inc.
Wagner Electric Corp.
Westinghouse Electric Corp.

MOTORS, GEAR

See GEARMOTORS

MOTORS—hydraulic

Char-Lynn Co.
The Commercial Shearing &
Stamping Co.
The Denison Engineering Co.
Densmore Engineering Co., Inc.
Hydraulic Power Div., Hydraulic
Press Mfg. Co., a Div. of
Koehring Co.
Ledeen Manufacturing Co.
The New York Air Brake Co.,
Kalamazoo Div.
The Oilgear Co.

MOTORS—variable speed

Bogue Electric Mfg. Co.
Century Electric Co.
Diehl Manufacturing Co.
Doerr Electric Corp.
Eaton Manufacturing Co.,
Dynamatic Div.
Fairbanks, Morse & Co.
Kurz & Root Co.
The Lima Electric Motor Co.
Link-Belt Co.
The Louis Allis Co.
The Master Electric Co.
The Oilgear Co.
Reliance Electric & Engineering Co.
Sterling Electric Motors, Inc.
U. S. Electrical Motors, Inc.

PACKINGS

L. P. Degen Belting Co. (leather &
rubber)
Goodall Rubber Co.
Graton & Knight Co.
(self-lubricating, molded, sheet)
E. F. Houghton & Co.
Johns-Manville Corp.
New York Belting & Packing Co.
J. E. Rhoads & Sons (leather)
PANELBOARDS—electric
Bailey Meter Co.
Bogue Electric Mfg. Co.
Bull Dog Electric Products Co.

Cleveland Fuel Equipment Co.
Cutler-Hammer, Inc.
Federal Pacific Electric Co.
Fischer & Porter Co.
General Control Co., Inc.
General Electric Co., Apparatus
Sales Div.
General Electric Co., Circuit
Protective Devices Dept.
(component parts)
I-T-E Circuit Breaker Co.
Industrial Control Panel Co.
Johns-Manville Corp.
Leeds & Northrup Co.
Line Electric Co.
The Louis Allis Co.
Rundel Electric Co. (special only)
Square D Co.
Taller & Cooper, Inc.
The Wadsworth Electric Mfg. Co.,
Inc.
Westinghouse Electric Corp.

PILLOW BLOCKS

Ahlberg Bearing Co.
American Brake Shoe Co.
Charles Bond Co.
Boston Gear Works
Chain Belt Co.
Dodge Manufacturing Corp.
Hewitt-Robbins, Inc.
The Jeffrey Mfg. Co.
Link-Belt Co.
Randall Graphite Bearings, Inc.
S. K. F. Industries, Inc.
Shafer Bearing Div., Chain Belt Co.
Standard Pressed Steel Co.
Stephens-Adamson Mfg. Co.
Webster Manufacturing, Inc.

PINIONS

See GEARS

PRESSURE REGULATORS

See REGULATORS, pressure

PULLEYS

Allis-Chalmers Mfg. Co.
American Brake Shoe Co.
American Pulley Co.
Amplex Div., Chrysler Corp.
Boston Gear Works
Chain Belt Co.
The Dayton Rubber Co.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
The Gates Rubber Co.
Gerbing Manufacturing Corp.
Hewitt-Robbins, Inc.
The Jeffrey Mfg. Co.
Link-Belt Co.
Lovejoy Flexible Coupling Co.
(variable speed)
Reeves Pulley Co. Div., Reliance
Electric & Engr. Co. (vari-speed)
United States Rubber Co.
Yuba Manufacturing Co.

PUMPS—hydraulic power

Adel Precision Products,
Div. General Metals Corp.
American Brake Shoe Co.
Char-Lynn Co.
The Commercial Shearing &
Stamping Co.
The Denison Engineering Co.
Fairbanks, Morse & Co.
Grover Smith Mfg. Corp.
Hydraulic Power Div., Hydraulic
Press Mfg. Co., a Div. of
Koehring Co.
Lincoln Engineering Co.
of California
The New York Air Brake Co.,
Kalamazoo Div.
Novo Pump & Engine Co.
The Oilgear Co.
Rockwell Manufacturing Co.
The Rucker Co.
Simplex Engineering Co.
U. S. Hoffman Machinery Corp.
Worthington Corp.

PUMPS—vacuum

Fuller Co.
Leiman Bros., Inc.
Roots-Connorsville Blower Div.,
Dresser Industries, Inc.

RECTIFIERS

Allis-Chalmers Mfg. Co.
American Pulley Co.
Bogue Electric Mfg. Co. (silicon)
General Electric Co.,
Apparatus Sales Div.
I-T-E Circuit Breaker Co.
Rundel Electric Co. (d.c.)
Westinghouse Electric Corp.

REDUCERS, SPEED—WIRE & CABLE

REDUCERS, SPEED—

bevel gear

American Pulley Co.
David Brown, Inc.
The Falk Corp.
Foote Bros. Gear & Machine Corp.
Hewitt-Robins, Inc.
The Louis Allis Co.
Lufkin Foundry & Machine Co.
(herringbone)
Morse Chain Co.
U. S. Electrical Motors, Inc.
Western Gear Corp.
Westinghouse Electric Corp.

REDUCERS, SPEED—

helical gear

American Pulley Co.
David Brown, Inc.
The Falk Corp.
Foote Bros. Gear & Machine Corp.
Hewitt-Robins, Inc.
Ledeon Manufacturing Co.
Link-Belt Co.
The Louis Allis Co.
Morse Chain Co.
Stephens-Adams Mfg. Co.
Sterling Electric Motors, Inc.
U. S. Electrical Motors, Inc.
Western Gear Corp.
Westinghouse Electric Corp.
Worthington Corp.

REDUCERS, SPEED—

planetary gear

David Brown, Inc.
Foote Bros. Gear & Machine Corp.
Hewitt-Robins, Inc.
Western Gear Corp.
Westinghouse Electric Corp.

REDUCERS, SPEED—

shaft mounted

American Pulley Co.
David Brown, Inc.
The Falk Corp.
Foote Bros. Gear & Machine Corp.
Link-Belt Co.
Western Gear Corp.
Westinghouse Electric Corp.

REDUCERS, SPEED—spur

gear

David Brown, Inc.
Foote Bros. Gear & Machine Corp.
Hewitt-Robins, Inc.
Link-Belt Co.
Western Gear Corp.
Westinghouse Electric Corp.

REDUCERS, SPEED—worm

gear

American Stock Gear Div.,
Perfection Gear Co.
Charles Bond Co.
Boston Gear Works
David Brown, Inc.
The Cleveland Worm & Gear Co.
Foote Bros. Gear & Machine Corp.
Hewitt-Robins, Inc.
Link-Belt Co.
The Louis Allis Co.
Morse Chain Co.
U. S. Electrical Motors, Inc.
Western Gear Corp.
Westinghouse Electric Corp.

REGULATORS—pressure

Binks Manufacturing Co.
Copes-Vulcan Div., Blaw-Knox Co.
Cutler-Hammer, Inc.
The DeVilbiss Co.
Fisher Governor Co.
General Controls Co.
Hannifin Corp. (air line)
Jordan Corp.
Ledeon Manufacturing Co.
Leslie Co.
Lincoln Engineering Co.,
of California
Mason-Neilan, Div. of Worthington
Corp.
The Mercoid Corp.
C. A. Norgren Co.
The Powers Regulator Co.
Rockwell Manufacturing Co.
Sarco Co., Inc.

A. Schrader's Son Div.,
Seovill Mfg. Co.
Westinghouse Air Brake Co.,
Industrial Products Div.
Weston Electrical Instrument Corp.,
subsidiary of Daystrom, Inc.

ROLLER CHAIN

See CHAINS FOR DRIVES

SHEAVES

Allis-Chalmers Mfg. Co.
American Brake Shoe Co.
American Pulley Co.
The Dayton Rubber Co.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
Durkee-Atwood Co.
Fort Worth Steel & Machinery Co.
The Gates Rubber Co.
Gerbing Manufacturing Corp.
Goodall Rubber Co.
Hewitt-Robins, Inc.
The Jeffrey Mfg. Co.
J. W. Minder Chain & Gear Co.
Webster Manufacturing, Inc.
Worthington Corp.
Yuba Manufacturing Co.

SPEED INCREASERS

See INCREASERS, speed

SPEED REDUCERS

See REDUCERS, speed

SPROCKETS

Advance Gear & Machine Corp.
American Brake Shoe Co.
American Stock Gear Div.,
Perfection Gear Co.
Amplex Div., Chrysler Corp.
Atlas Chain & Mfg. Co.
Charles Bond Co.
Boston Gear Works
Chain Belt Co.
Cushman Wheel Co.
Diamond Chain Co., Inc.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
Gear Engineering & Mfg. Co., Inc.
The Jeffrey Mfg. Co.
Johnson Gear & Mfg. Co., Ltd.
Link-Belt Co.
J. W. Minder Chain & Gear Co.
Morse Chain Co.
Philadelphia Gear Works, Inc.
Ramsey Chain Co., Inc.
Union Chain & Mfg. Co.
Webster Manufacturing, Inc.
Western Gear Corp.
Whitney Chain Co.
Yuba Manufacturing Co.

STEAM TRAPS

See TRAPS, steam

SUBSTATIONS—unit

Allis-Chalmers Mfg. Co.
Federal Pacific Electric Co.
General Electric Co.,
Apparatus Sales Div.
I-T-E Circuit Breaker Co.
Rundel Electric Co.
Sorgel Electric Co.
Westinghouse Electric Corp.

SWITCHES—automatic

Allen-Bradley Co.
Automatic Switch Co.
Cutler-Hammer, Inc.
General Control Co., Inc.
General Electric Co.,
Apparatus Sales Div.
I-T-E Circuit Breaker Co.
The Mercoid Corp.
Micro-Switch Div.,
Minneapolis-Honeywell Co.
Rundel Electric Co.
Square D Co.
Taller & Cooper, Inc.

SWITCHES—electric

Allen-Bradley Co.
Automatic Switch Co.
Bull Dog Electric Products Co.
The Clark Controller Co.
Cutler-Hammer, Inc.
Electro Snap Switch & Mfg. Co.
Federal Pacific Electric Co.

Furnas Electric Co.
General Control Co., Inc.
General Electric Co.,
Apparatus Sales Div.
General Electric Co., Circuit
Protective Devices Dept. (safety)
General Electric Co., Construction
Materials Div.
I-T-E Circuit Breaker Co.
Licon Switch & Control Div.,
Illinois Tool Works
The Mercoid Corp.
Micro-Switch Div.,
Minneapolis-Honeywell Co.
Rundel Electric Co.
Square D Co.
Taller & Cooper, Inc.
The Wadsworth Electric Mfg. Co.,
Inc.

SWITCHGEAR EQUIPMENT

Allis-Chalmers Mfg. Co.
Automatic Switch Co.
Bull Dog Electric Products Co.
The Electric Storage Battery Co.
Federal Pacific Electric Co.
G & W Electric Specialty Co.
General Control Co., Inc.
General Electric Co., Apparatus
Sales Div.
I-T-E Circuit Breaker Co.
Rundel Electric Co.
Square D Co.
Taller & Cooper, Inc.
Westinghouse Electric Corp.

TIMING BELTS

See BELTS, timing

TORQUE CONVERTERS

Twin Disc Clutch Co.
Western Gear Corp.

TRANSFORMERS

Allis-Chalmers Mfg. Co.
Federal Pacific Electric Co.
General Controls Co.
General Electric Co., Apparatus
Sales Div.
Hevi-Duty Electric Co.
I-T-E Circuit Breaker Co.
Kuhlman Electric Co.
Moloney Electric Co.
Sorgel Electric Co.
Wagner Electric Corp.
Westinghouse Electric Corp.

TRANSMISSION, VARIABLE

SPEED

Allis-Chalmers Mfg. Co.
American Pulley Co.
Bogue Electric Mfg. Co.
Boston Gear Works
The Cleveland Worm & Gear Co.
R. & J. Dick Co., Inc.
Dodge Manufacturing Corp.
Easton Manufacturing Co.,
Dynamatic Div.
Electro-Devices, Inc.
Fairchild Engine & Airplane Corp.,
Speed Control Div.
Gerbing Manufacturing Corp.
The Lima Electric Motor Co.
Link-Belt Co.
The Louis Allis Co.
Morse Chain Co.
The Oilgear Co.
Philadelphia Gear Works, Inc.
Reeves Pulley Co. Div., Reliance
Electric & Engrg. Co.
Reliance Electric & Engineering Co.
Rockwell Manufacturing Co.
Sterling Electric Motors, Inc.
U. S. Electrical Motors, Inc.
Western Gear Corp.
Worthington Corp.
Zidell Machinery & Supply Co.

TRAPS—steam

Crane Co.
The Powers Regulator Co.
Sarco Co., Inc.

UNIT SUBSTATIONS

See SUBSTATIONS, UNIT

VALVES—air power line

Airmatic Valve, Inc.
Automatic Switch Co.
The Bellows Co. of California
Copes-Vulcan Div., Blaw-Knox Co.
(pressure reducing)
Crane Co.
Densmore Engineering Co., Inc.
Fischer & Porter Co.
The Foxboro Co.
Galland-Henning, Nopak Div.
General Controls Co.
Grover Smith Mfg. Corp.
Hanna Engineering Works
Hannifin Corp.
The Imperial Brass Mfg. Co.
Jordan Corp.
Ledeon Manufacturing Co.
Leslie Co.
Lincoln Engineering Co. of Cal.
Logansport Machine Co., Inc.
Mason-Neilan, Div. of
Worthington Corp.
Modernair Corp.
C. A. Norgren Co.
Philadelphia Gear Works, Inc.
The Powers Regulator Co.
Renco-Toledo, Inc.
Rockwell Manufacturing Co.
Ross Operating Valve Co.
The Rucker Co.
A. Schrader's Son Div.,
Seovill Mfg. Co.
Skinner Electric Valve Div.
Snap-Tite, Inc.
Westinghouse Air Brake Co.,
Industrial Products Div.

VALVES—hydraulic power line

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Div. General Metals Corp.
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Automatic Switch Co.
The Bellows Co. of California
Char-Lynn Co.
The Commercial Shearing
& Stamping Co.
Crane Co.
The Denison Engineering Co.
Densmore Engineering Co., Inc.
Galland-Henning, Nopak Div.
General Controls Co.
Hanna Engineering Works
Hydraulic Power Div.,
Press Mfg. Co., a Div. of
Koehring Co.
The Imperial Brass Mfg. Co.
Jordan Corp.
Ledeon Manufacturing Co.
Leslie Co.
Lincoln Engineering Co.
of California
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Modernair Corp.
The New York Air Brake Co.,
Kalamazoo Div.
The Powers Regulator Co.
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Roelyn, Inc.
The Rucker Co.
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Skinner Electric Valve Div.
Snap-Tite, Inc.

VARIABLE SPEED MOTORS

See MOTORS, variable speed

VARIABLE SPEED

TRANSMISSIONS

See TRANSMISSION,
variable speed

V-BELTS

See BELTS, V

WIRE & CABLE—electric

Anacosta Wire & Cable Co.
Collyer Insulated Wire Co., Inc.
Columbia Cable & Electric Corp.
G & W Electric Specialty Co. (high
voltage cable accessories)
General Cable Corp.
General Electric Co., Construction
Materials Div.
National Electric Products Corp.
The Okonite Co.
Rockbestos Products Corp.
Triangle Conduit & Cable Co., Inc.
United States Rubber Co.
Western Insulated Wire Co.

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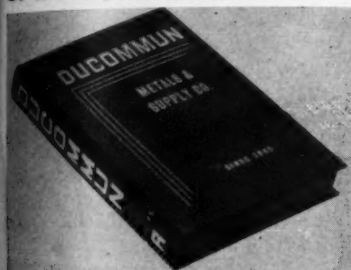
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HELPFUL LITERATURE for the West's plant operating executives

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955-page encyclopedia of metals, tools, abrasives



A more complete listing of metals, tools, abrasives, and industrial supplies than is contained in this 955-page hard-cover encyclopedic volume would be hard to find. It includes everything from abrasive bands to zip grinding compound, and all are listed individually in a 40-page index, which enables you to find exactly what you're looking for in a matter of seconds. Each item is pictured and all pertinent information given. A special section, called "Metallurgical and Engineering Data," included in the back of the volume, presents information on alloys, gives formulae, analyses, mechanical properties, comparison tables, specifications, dimensions, tolerances, fabrication recommendations, weights, and much other important data. This section is separately indexed. *Ducommun Metals & Supply Co.*

... for your copy, circle No. 200

Answers to 57 questions about diesel engines

The 24 pages of this booklet ask and answer 57 questions about diesel engines, ranging from "What is a diesel engine?" to "How are the intermittent and continuous duty ratings determined?" Well illustrated, the book presents the basic principles of diesel operation. Each question is asked and answered in simple, non-technical terms. *Cummins Engine Co., Inc.*

... for your copy, circle No. 201

Vacuum calculator gives pump capacity, time data

The face of this vacuum calculator may be used for determining the needed pump capacity and time required to evacuate a given volume to a specified vacuum. The back of the calculator contains pertinent information such as a conversion table for high vacuum, metal vaporization data and a chart of boiling points of solvents under vacuum. A small slide rule is also included for calculations. *F. J. Stokes Machine Co.*

... for your copy, circle No. 202

Application picture book for Rex Z-Metal chain

Opening with the advantages of Rex Z-Metal chain, this 12-page brochure continues to picture 12 different applications for the chain and to explain its use for each one. Enlarged photographs of the chain are included as well as charts with pertinent information. The final pages picture and describe 11 different types of chain. (Bulletin 53-56) *Chain Belt Co.*

... for your copy, circle No. 203

37 motor designs for electrical equipment users

This 40-page manual designed for engineers, designers, and users of electrical equipment contains 37 motor designs. Data accompanying them includes volts, amperes, horsepower, speed, duty, rotation, ambient temperature, weight, and dimensions. Types of motors detailed include permanent magnet d-c., series wound d-c., compound wound d-c., single valve capacitor start and run a-c., and motor and fan assembly combinations. (Bulletin 254-A) *Western Gear Corp.*

... for your copy, circle No. 204

104-page catalog on hand tools for production

Pictured and described in this 104-page catalog is every type and kind of hand tool made by Snap-On, which sells directly to industry through its 42 branch offices, by sending men with tools to you so you can try before you buy. Tools reviewed include wrenches, ratchets, screw drivers, pliers, hammers, etc. A few hand power tools are included, as well as information on specialty items, such as the all-purpose nut turning set or the mechanic's hold tool assortment. A price list is also included with the catalog when it is sent. (Catalog UR) *Snap-On Tools Corp.*

... for your copy, circle No. 205

A complete notebook on electrical connectors

This eight-page booklet is a primer on electrical connectors, opening with design features and construction and concluding with tests performed to prove the connectors. The booklet is well illustrated with both pictures and diagrams and complete specifications are included. The firm's numbering system is explained and accompanied with ordering instructions. *Titeflex, Inc.*

... for your copy, circle No. 206

Application data, specs on transformers, substations

These two booklets cover in detail the construction features of load center transformers and substations. Large pictures illustrate the units, showing both exteriors and interiors. Application data is given along with specifications. (Bulletins 655, 155) *Sorgel Electric Co.*

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*For Lower-Cost
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Longer Service Life*



The problems of vibration, undesirable sound resulting from it, or expansion and contraction, are met with reliable efficiency and economy in GOODALL Rubber EXPANSION JOINTS . . . products of long experience and uncompromising craftsmanship.

WIDE SELECTION . . . Three Types—"Flang-Lok," Right Angle and Sleeve. Five styles—Single Arch, Multiple Arch, Tapered, Offset and Rectangular. All sizes—From $\frac{3}{8}$ " I.D. to 96" I.D. For pressure, vacuum or both.

EASIER TO INSTALL . . . on new construction or as replacements for other types. Light in weight . . . short face-to-face dimensions . . . retaining rings or flanges quickly aligned and bolted. "Flang-Lok" Joints are especially easy to install, and provide a nonmetallic seal.

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See Directory listing page 94

NMTBA listing of 123 available motion pictures

Some 123 motion pictures on machine tools and machining operations are listed in this 24-page booklet. Seventy-nine of the films are in color and they range in showing time from 10 to 40 min. All films are available without charge upon request to the member companies producing them. These companies are listed alphabetically in the book; under company name and address is a list of films available from that firm. Most films are concerned with specific machining operations, although a few tell the story of the part played by machine tools in general. Most films are 16mm. with sound. *National Machine Tool Builders' Assoc.*

. . . for your copy, circle No. 208

Chart showing where to use which electrical connector

This four-page leaflet will answer your questions about where to use which electrical connector. It pictures and identifies six different types of plugs and gives a chart showing their uses. Six pictures show applications of the shatter and distortion-proof connectors for heavy industrial needs. Final page treats a special lamp socket for industrial use. (Bulletin B-41) *Joy Manufacturing Co.*

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Brochure on packaged remote control system

A four-page, two-color brochure covers the plug-in packaged remote control system for two position operation of starters, pumps, valves, loaders, gates, operators, etc. Techniques of the system are described and a complete diagrammatic layout included on how it works. *Sparks-Withington Co.*

. . . for your copy, circle No. 210

4-page condensed catalog of general-purpose motor prices

This four-page leaflet is a complete condensed catalog of general-purpose fractional and integral horsepower motor prices. It opens with a cross reference chart of old and new NEMA frame sizes side by side for quick reference back and forth. Motor charts are divided into columns for single phase, polyphase, and direct current, while frame charts are divided into totally enclosed and explosion proof columns. General fractional horsepower dimensions and standard modifications are both given as well as general integral horsepower motor dimensions. *Marathon Electric Manufacturing Corp.*

. . . for your copy, circle No. 211



Grays Harbor Veneer Corporation, Hoquim, Washington, uses 19 and 20 gauge USS Galvanized Stapling Wire for stitching fruit box tops. In one machine operation the wire is cut to length, formed into staple shape, then driven and clinched into the veneer slats. Grays Harbor Veneer says USS Wire doesn't snarl coming off the coil. This smooth feeding saves man-hours and eliminates wire waste.



Wire for every purpose from a single source

From stapling wire to hot-rolled rods . . . no matter how specialized your requirements, United States Steel can produce wire to fit your exact needs. With the most versatile wire making facilities in the West, we can supply more than 1,000 types, grades and finishes of USS Manufacturers Wire.

But *quantity* and *variety* are only a part of our story. United States Steel sells tailor-made wire with the kind of *quality* that results in smoother running machinery, fewer rejects and a finer finished product. USS Wire Specialists are always ready to help you select the right wire for your job.

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Unichrome processes and products contribute to more efficient metal finishing operations . . . improved results . . . reduced finishing costs.

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GENERAL OFFICES: RAHWAY, NEW JERSEY

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Guide to easy selection of bus conductors

This 62-page book, with a table of contents and an index, was designed to make the selection of bus conductors easier. The introduction defines a bus conductor and discusses types. Another section covers the physical and electrical properties of copper for electrical conductors. Included are tables for such shapes as channels, ventilated square tubes, and round tubes, also for other rigid bus conductor shapes. Data for bare copper wire and cable as well as the more commonly used alloy wires are given. (Publication C-25) *American Brass Co.*

... for your copy, circle No. 212

Automation controls for rotating hydraulic drives

This eight-page booklet, titled "A Search for Controls for Industrial Rotating Hydraulic Drives," is a reprint of a talk given by Milton G. Malmquist of Minnesota Mining & Manufacturing Co. before the National Conference on Industrial Hydraulics. Automation and its application in performing operations on continuous webs are the main subjects of the talk, which also covers the problems of tension, speed, control, acceleration, deceleration, torque, and synchronization. The reprint is illustrated with six drawings. (Bulletin 15011) *Oilgear Co.*

... for your copy, circle No. 213

Data on complete line of industrial controls

This 44-page industrial controls booklet describes General Controls' complete line of diaphragm gas valves, solenoids, two, three, and four-way valves, lever action and piloted piston valves, safety shutoff valves, and others. Information given for each includes general description, complete specifications and several pertinent data charts. Each valve is also illustrated. *General Controls Co.*

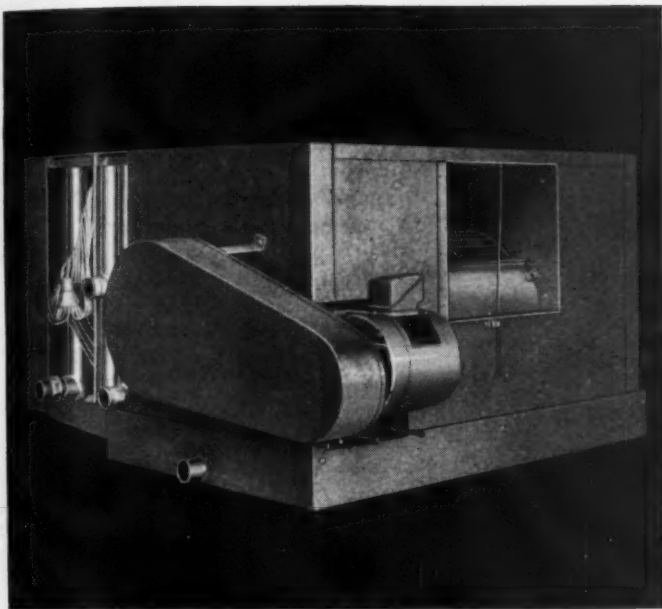
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Easy-to-read data book on hydraulic cylinders

Class 4 hydraulic cylinders for 2,000-psi. service are described in an easy-to-read 12-page brochure which gives detailed engineering and dimensional data. Feature and parts cross-sections, mounting brackets, rod clevises, and special cylinders are also described. (Catalog 104) *Nopak Division, Galland-Henning.*

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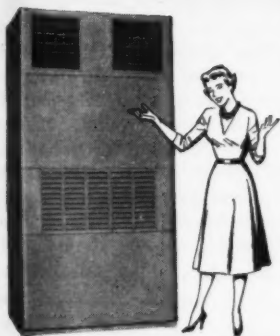


American Blower central-station cabinet-type air conditioning units cool and dehumidify in summer using chilled water, direct-expanded refrigerants, or brines; and heat and humidify in winter with steam or hot water. Quiet slow-speed fans, aileron air-volume adjustment, and air-mixing dampers combine high efficiency with accurate control to assure perfect year-round temperatures at low operating cost.

Built in sections of heavy-gauge zinc-coated steel, these units resist corrosion, make handling and erection easier. Filter boxes, piping, air discharges, and standard motors can be positioned *during installation* to meet requirements exactly. They occupy a minimum of space relative to output (capacities: 600 cfm to 48,000 cfm), and are available in horizontal or vertical arrangements, for floor or ceiling mounting.

For full details on American Blower air conditioning equipment—contact our nearest branch office, or write us direct.

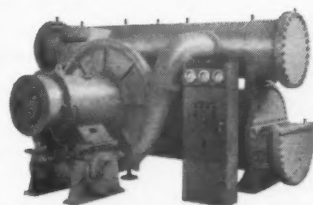
Whatever type air conditioning system you plan, we have equipment to meet your exact requirements



Packaged Air Conditioners—
Durably finished, quiet operating, 3- thru 20-ton capacities.



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Tonrac —Single-Stage Hermetic Centrifugal Refrigerating Machines have few moving parts, install on single level. Completely self-contained.

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115



Spikes reduce slipping on ball diamonds,



but ordinary shoes are SAFE SHOES

on low cost A.W. SUPER-DIAMOND

ECONOMY ROLLED STEEL FLOOR PLATE

Ordinary flat-soled shoes—material-handling equipment, too—move safely over SUPER-DIAMOND's traction treads—from any angle of approach. The raised diamond pattern—40 steel diamonds to the step—has been exclusively designed and engineered for maximum foot safety at minimum cost.

No other floor plate can match A.W. SUPER-DIAMOND for safety, durability and easy maintenance at so low a cost. Write for detailed information.

- No matching problems
- Easily fabricated
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- Cleans, drains rapidly
- Takes years of abuse

A.W. SUPER-DIAMOND
ROLLED STEEL FLOOR PLATE

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For plants where oil, water and grease raise special problems of slipping accidents, we suggest a check on the special qualities of A.W. ALGRIP . . . the world's only abrasive rolled steel flooring.



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Specification sheets on electric brakes, clutches

Specifications for electric brakes, clutches, and clutch-brakes are given in this eight-page brochure, which covers primary, fractional and integral horsepower types and also controls for machines equipped with electric brakes and clutches. Photographs and drawings of the different brakes and clutches are included with construction features pointed out. Much information is given in chart form for quick reference. Electric motor brakes are treated briefly on the final page. *Warner Electric Brake & Clutch Co.*

. . . for your copy, circle No. 216

68-page manual on roller and wheel conveyors

This roller and wheel conveyor manual opens with three pages of roller conveyor specifications and load ratings and continues to discuss individual conveyors. Each is diagrammed and specifications are given. Included in the manual are light, medium, and heavy-duty roller conveyors, along with flanges and shot guards for them, conveyor supports. Spring-mounted conveyors are pictured and discussed briefly at the close of the book. (Catalog 156) *Mathews Conveyor Co.*

. . . for your copy, circle No. 217

Cross reference for old, new NEMA motor ratings

This four-page brochure contains a cross reference between old and new NEMA horsepower and dimension ratings for motors and covers current pricing for 1/20 through 1,000-hp. motor sizes on both fractional and integral horsepower motors. It includes an adapter basis and prices from old to new NEMA frame mountings. *Marathon Electric Manufacturing Corp.*

. . . for your copy, circle No. 218

40-page stock catalog of specialty steels

Instructions for selecting the right low carbon steel and whether to specify sheet coil or strip steel open this 40-page stock catalog. The balance of the book treats the steels available from Cold Metal Products, giving sizes and temper for each. Included are low carbon strip, shim, coated, alloy steels as well as those of aircraft quality, a wide range of stainless, and others. Catalog is indexed on the cover. *Cold Metal Products Co. of California.*

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THREE WAYS TO SPEED TRUCK LOADING

"LIFT-PORTATION" EXPEDITES MATERIALS HANDLING . . CUTS COSTS

By JOHN R. QUEEN

Vice President and General Manager

No matter how snugly a truck is backed up to your loading dock, there is still a gap and a height variation between the truck bed and the dock. The operation of passing goods across this gap is costly, time-consuming, and can be dangerous.

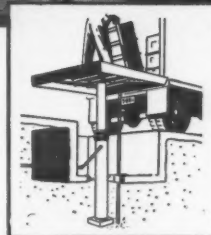
You can bridge this gap by using one of three modern mechanical loading devices manufactured by Globe Hoist Company. Each of these devices is easily installed . . . will pay for itself quickly by speeding the movement of goods in and out of your business establishment.



All too often the "standard" height above road level of shipping docks is either too high or too low for most truck bodies. Hand trucks and fork trucks operate with great difficulty over makeshift ramps. Because of slow loading and unloading, trucks wait for platform space . . . costly delays result for shipper and receiver.

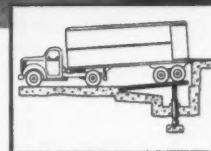
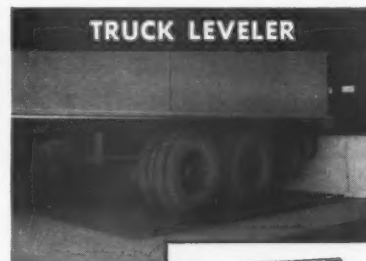
Installation of a Globe Trans-O-Matic Ramp provides smooth travel regardless of differences between truck bed and platform. Fast pushbutton control brings dock level to truck level. The Ramp's steel lip moves 15" up or down . . . floats with either rising or lowering action of truck or trailer floor. And you can handle two or three times more freight on your present dock area. Ramp sustains rollover weight of 20,000 lbs., storage loads up to 400 lbs. per sq. ft.

Designed to eliminate ramps, gangplanks, and manual lifting, Globe Platform Lifts permit fork trucks or hand trucks to be run on the platform at ground level and, after being raised by smooth hydraulic power, to run into the truck. Loads are moved on the level . . . accidents and breakage are minimized.



Globe Platform Lifts are low-cost and designed to fit most needs. Lifting capacities range from 5,000 to 80,000 lbs. Platform raises to 58", can be controlled either by air-oil unit or Globe Oil Pump.

Where it is more practical to position the truck or trailer, Globe Truck Levelers are used to raise or lower bodies so that beds are flush with platform.



Truck Levelers position the rear of a vehicle by raising or lowering the rear wheels. The unit consists of a sturdy hinged ramp powered by two hydraulic rams. A Globe Electric Oil Pump supplies the power. Size is 10x12 feet . . . lifting capacity is 40,000 lbs.



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Two complete data books on heavy-duty compressors

Heavy-duty single-stage compressors are thoroughly detailed in these two leaflets, which total 24 pages. Special features are listed, while cylinder design, regulation, and maintenance are all discussed. Each important part of the compressor is pictured and described. Charts give cylinder sizes, rpm., piston displacement, discharge pressure, and general dimensions. A large cutaway photograph shows the complete compressor with all construction features pointed out. (Bulletin 728 & Supplement D-2) *Chicago Pneumatic Tool Co.*

... for your copy, circle No. 220

Facts you should know about grounding electricity

This 12-page booklet interprets and clarifies new and revised requirements of the 1953 National Electrical Code that pertain to the safe operation of portable tools and appliances. It is designed to benefit users of this equipment by providing information on specifying, installing, and using portable electrical equipment. Much space in the illustrated book is given to grounding and segregation of voltages. A final section describes the firm's complete line of grounding devices. *Arrow-Hart & Hegeman Electric Co.*

... for your copy, circle No. 221

24-page data manual on precision holding devices

Twelve precision holding devices are detailed on the pages of this book which devotes a section to each: Grip-Master vise and fixture base, fixture lock, safety drill vise, air vise, three-sided vise, band saw vise, self-centering air vise, air clamp, camlock vise, combination shear, nibbler, punch, and rod cutter, drill press vise, and air accessories. Each section has a large photograph of its particular vise with smaller close-ups of important parts. Each part is marked on the photograph and explained in the text. Diagrams, specifications, and prices are also included. *Heinrich Tools, Inc.*

... for your copy, circle No. 222



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This selector for rubber covered hydraulic hose contains the latest SAE and industry specifications. With the selector you can start with any known factor, such as ID, OD, minimum burst, working pressure required, or bend radius, and determine the proper hose for your needs. Very simple to use. *Republic Rubber Division, Lee Rubber & Tire Corp.*

... for your copy, circle No. 223

Buyers' guide to tubing for hydraulic cylinders

This eight-page booklet is a buyers' and designers' guide to steel tubing and cold finished steel bars for hydraulic cylinders and fluid lines. Engineering data on cylinder tubing and hydraulic fluid line tubing is given, along with information on cold drawn welded cylinder tubing and seamless tubing drawn to OD and ID tolerances for honed cylinders. Tolerances, mechanical properties, and bursting pressures are given. (Bulletin 12-6) *Joseph T. Ryerson & Son, Inc.*

... for your copy, circle No. 224

How slotted angle makes racks, carts, stands, frames

This eight-page picture book should give you many ideas for using slotted angles. Photographs and descriptions of current industrial applications show the angle filling a wide variety of plant maintenance and equipment needs. Slotted angle accessories are also included along with simple instructions for using the material. *Dexion Division, Acme Steel Co.*

... for your copy, circle No. 225

1932

1956

Installed 24 years ago.....still in excellent condition Here's another Wrought Iron Plate durability story

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See Directory listing page 96

Picture-data book on steam, electrical equipment

This 16-page book is divided into two sections; the first on steam equipment and related products, and the second on electrical equipment. In the first section pictures and data are included on steam turbines, condensers, ejectors, turbochargers, tube cleaners, centrifugal compressors, deaerating heaters, and strainers. A brief history of the firm, which started in business by making steam products is included. The second section treats a-c. and d-c. motors, a-c. and d-c. generators, motor-generator sets, synchronous condensers, and couplings. (Bulletin Q-14A) *Elliott Co.*

... for your copy, circle No. 226

Notebook of data sheets on control equipment

Clipped into this notebook are about 15 different data booklets on control equipment. Each has good illustrations and thorough descriptions of the equipment treated. Covered are the sequential automatic data recorder and annunciator (this booklet is accompanied by several case-history type articles on the machine's use), remote control systems, hydrogen analyzer, carbon monoxide detector,

supersensitive analyzer for detecting hazardous gases in low concentrations, admission control systems, and a digital converter. *Taller & Cooper, Inc.*

... for your copy, circle No. 227

Operator's manual for Towmotor truck owners

A pocket sized operator's manual for owners and operators of Towmotor lift trucks is indexed for ready reference, and divided into sections on basic specifications and construction features, detailed operating instructions, safety tips, and proper handling techniques. The booklet also covers preventive maintenance procedures and has a 32-point maintenance check list. *Towmotor Corp.*

... for your copy, circle No. 228

Loose-leaf notebook on stationary, portable racks

This notebook covers both stationary and portable storage racks and has many pictures and diagrams of both types. Included in the section on stationary racks are pallet, ratchet, skid, die storage, and drum and barrel storage racks, while the portable section includes tiering, folding, and coil stock racks. Construction of all racks is explained. *American Metal Products Co.*

... for your copy, circle No. 229

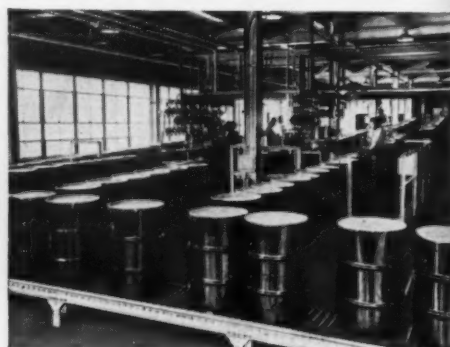
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WESTERN INDUSTRY — September 1956

Diagram, data book on 56 subminiature switches

Fifty-six subminiature switches, auxiliary actuators, and switch assemblies are covered in this 16-page booklet, which presents detailed diagrams of almost every one and accompanies each with a thorough description. You will find information on sealed environment-free switches and actuators, illuminated push-button assemblies, light force push-button switches, and a new series of sealed, multi-circuit toggle switch assemblies. (Catalog 75a) *Micro Switch Division, Minneapolis-Honeywell Regulator Co.*

... for your copy, circle No. 230

80-page guide book to industrial controls

Opening with several pages on applications for industrial controls, this 80-page book continues automatic control systems; temperature, humidity, and pressure controllers; pneumatic and electric relays, switches, electric motors, valves, and accessories. A section is devoted to each category of control, with clear diagrams and explanations of how they work. Specifications for each are given and many photographs also included. (Catalog 8305-R) *Minneapolis-Honeywell Regulator Co.*

... for your copy, circle No. 231

Data on how to use sprayable vinyl coatings

Unichrome Super 5300, a sprayable vinyl coating, is treated in this four-page leaflet, which explains how the plastisol can be sprayed in coatings up to 60 mils thick in a single application. Special features of the plastisol are discussed and brief instructions for application given. (Bulletin SP-1) *Metal & Thermit Corp.*

... for your copy, circle No. 232

Complete pocket guide to strappers, steel strapping

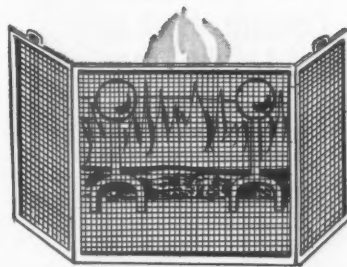
Called the "Blue Book of Packaging," this pocket sized guide book includes information on steel strapping, all kinds of strapping machines, and accessories. Opening with a steel strapping comparison chart, the guide continues to picture and give information on machines, cutters, mobile dispensers and containers for round steel strapping, as well as sealers, cutters, and dispensers for flat steel strapping. The story of the development of the firm is also included. *Gerrard Steel Strapping Division, United States Steel Corp.*

... for your copy, circle No. 233



in making fine textiles

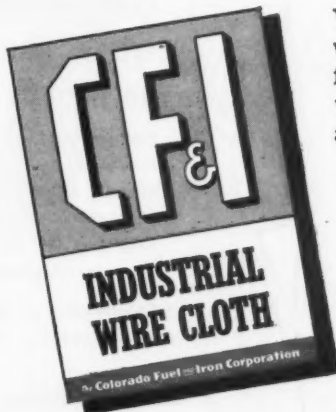
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... for more details, circle No. 69

122

Hydraulic power units for industrial applications

Pump-on-tank and pump-in-tank power units, for use with presses, machine tools, etc., are thoroughly detailed in this four-page leaflet, which opens with a large picture of a standard unit with construction features pointed out. Other models are pictured and described on the inside pages. Specifications for both power units are given and optional equipment and assemblies are discussed. An automatic hydraulic press, test bench, and log barker power unit are discussed briefly on the final page. *Rucker Co.*

... for your copy, circle No. 234

Guide to selection of automatic transfer switches

Designed to simplify specification of automatic transfer switches, this 16-page book, called "Factors to Consider in the Selection of Automatic Transfer Switches," lists ten features required for adequate design and then explains why these features are essential. Factors considered include currents, continuous duty rating, ability to transfer load, thermal capacity,

source control, time delay, and accessories. Additional information covers selection of type of switch, how to specify switch capacity, and calculating line currents. Illustrated. *Automatic Switch Co.*

... for your copy, circle No. 235

176-page reference handbook on aluminum and its alloys

"Alcoa Aluminum Handbook" is a 176-page reference book presenting data on aluminum and its alloys and mill products in easy-to-read tabular form. The book has information on alloy standards as well as the properties, sizes, and tolerances of mill products usually produced from them. The introductory section explains the code numbering system employed to designate alloys and their modifications, while subsequent sections deal with wrought alloys; sheet and plate; wire, rod, and bar; extrusions; tube and pipe; electrical conductor; structural shapes; forgings, and casting alloys. Book has 140 tables. Secure your copy by writing on company letterhead to *Aluminum Co. of America, 781 Alcoa Building, Pittsburgh 19, Pa.*



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WESTERN INDUSTRY — September 1956

Background on structural adhesive bonding

An explanation of structural adhesive bonding techniques is contained on the 20 pages of this illustrated brochure, which covers the basic design concept of adhesive bonding and its wide use in the aircraft field. Extensive technical data on high temperature adhesives for metal-to-metal and sandwich applications is included. *Narmco Resins & Coatings Co.*

... for your copy, circle No. 236

Book on underhung type overhead cranes

A complete line of underhung type overhead cranes is described in this 16-page manual. Types of cranes covered include push type flexible bridge and standard, hand geared, and various modifications of motor-driven types. Top and side view line drawings with dimensions are given for each model followed by complete dimension tables including I-beam, hanger, and wheel load data. Included are two pages covering various types of hangers for monorails and underhung crane runways. (Bulletin U-200-1) *Chicago Tramrail Corp.*

... for your copy, circle No. 237

Two picture leaflets on crushers, grinders, shredders

Rolling ring metal turnings crushers for reducing machine turnings to shoveling chips are covered in this eight-page leaflet, which lists the advantages of the crushers and has several pictures, including cutaways, showing their operation and pointing out construction features. One page is devoted to clearance and foundation plan diagrams for the crushers. A second leaflet pictures and gives specifications for crushers, grinders, shredders, and choppers. *American Pulverizer Co.*

... for your copy, circle No. 238

Data on Productolog electric recorders

Functions of the Productolog for industrial machines and commercial vehicles are explained in this four-page brochure, which pictures the instrument, shows charts that it has produced and the data that it records, such as running and down times of machines and travel use of vehicles. Twelve different models are listed and their differences noted. Brief information is also included on the driveless Hubodometer, d-c. and a-c. hour log. (Book PR-555) *Engler Instrument Co.*

... for your copy, circle No. 239

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Consider these points:

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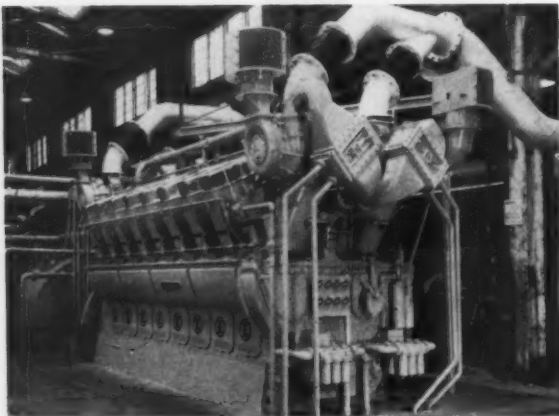
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NEW EQUIPMENT for Western plant operation, production, and maintenance

USE RIP-OUT POST CARD, page 109, for more information on products described.

MIDGET GIANT ENGINE

... is this 7,000-hp. V diesel

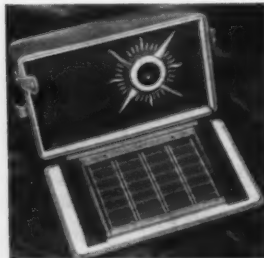


Although this V diesel engine is 12 ft. high, measures 26 1/3 ft. in length and weighs about 95 tons, it is the smallest diesel in the world rated at 7,000 hp., according to the manufacturer. Called the Model RV-16 the engine has pistons 1 1/2 ft. in diameter and connecting rods measuring 4 ft. in length. The connecting rod design permits opposite cylinders in the V to lie in the same plane, a novel feature for a V engine, reducing the over-all length. For each pair of pistons in the RV-16, there is only one rod connected in the conventional manner to the crankshaft. The other rod is a short "slave" linked to the "master" rod. This arrangement means only eight connecting rod bearings and therefore permits greater crankshaft bearing area for the thrust of each piston. Also available with 12 cylinders, the engine is built in four pieces for ease of shipment, installation, and maintenance. The selling price of a single engine, with the necessary attachments, is in the neighborhood of \$400,000. It is powerful enough to propel ships or will drive electric generators in industrial plants, and serve in oil and water pumping stations. *Enterprise Engine & Machinery Co.*

... for more details, circle No. 240 on postcard

SUN BATTERY

... provides power for transistors

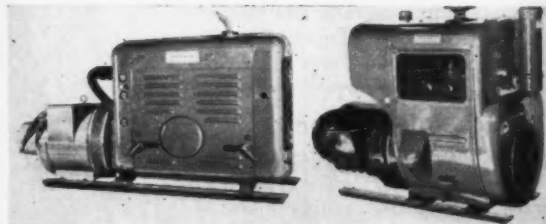


This sun battery, Type SB-24B5, is a converter for transforming solar energy into electrical power and is designed as a power supply for transistors. The battery has 24 photosensitive elements connected in series. Output voltage is approximately 6 v. at maximum power transfer operation and 12 v. under open circuit conditions. Maximum operating temperature of the battery is 85 deg. C. continuous duty and 100 deg. C. intermittent duty. The battery is shown powering a seven-transistor heterodyne radio. *International Rectifier Corp.*

... for more details, circle No. 241 on postcard

ELECTRIC PLANTS

... with automatic control apparatus



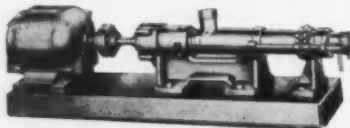
Two groups of gasoline electric plants, with automatic and semi-automatic control apparatus for special applications, have been added to the Gen-A-Matic line of generators. Both air and water-cooled models with ratings from 400 to 75,000 w. are available, as well as three separate lines of diesel electric plants ranging from 10,000 to 300,000 w. Any desired control configuration may be specified for the new models. *Gen-A-Matic Corp.*

... for more details, circle No. 242 on postcard

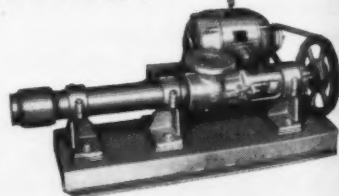
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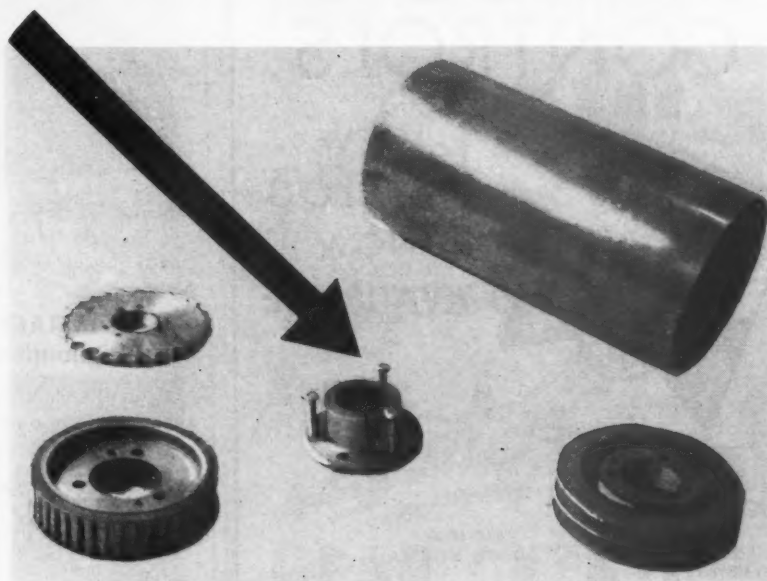
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WESTERN INDUSTRY — September 1956

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1 HUB FITS THE BIG 4

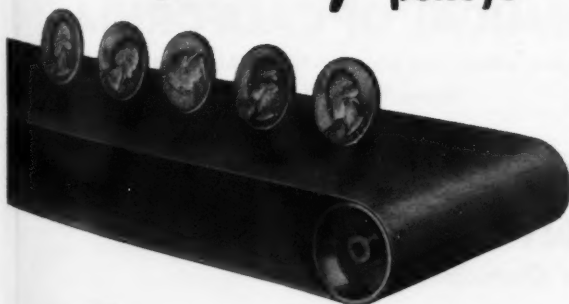
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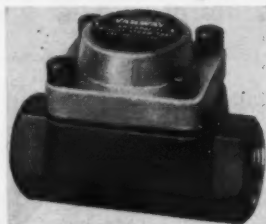
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See Directory listing page 98

IMPULSE STEAM TRAP

... for handling heavy condensate loads



The No. 40 Series of impulse steam traps was designed especially with high capacity to handle heavy condensate loads. Trap has high capacity at all pressures up to 600 lb., good low pressure operation, and freeze-proof operation against back pressure up to 50%. Available in 1/2 and 3/4-in. sizes, traps have stainless steel body and internal parts. Yarnall-Waring Co.

... for more details, circle No. 243 on postcard

TRUCK ATTACHMENT

... for handling palletless loads



This industrial truck attachment will carry and stack variously patterned loads of different size cartons without pallets. It is not restricted to a single pattern or voids or empty spaces in the bottom row of cartons into which the forks are inserted, because it has adjustable outer forks which may be moved horizontally to accommodate varying load widths, patterns, and carton sizes. The attachment will tier loads three high. Automatic Transportation Co.

... for more details, circle No. 244 on postcard

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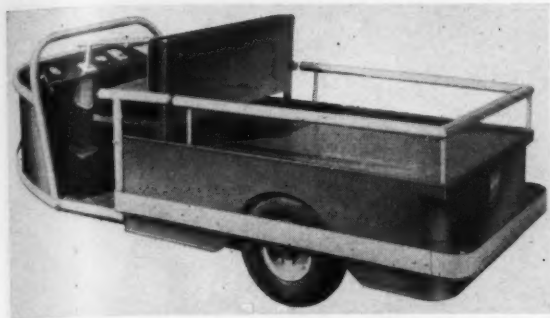
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ELECTRIC DELIVERY TRUCK

... for light to medium hauling jobs



Model 7 is an all-purpose electric delivery truck for light to medium delivery and hauling jobs. It has speeds up to 12 mph. forward and reverse, and is equipped with foot and hand brakes. A 36-v. d-c. heavy-duty ball bearing motor and six batteries deliver enough power to operate the unit up to 12 hr. without recharging. For operating comfort the unit has air-foam seat cushions and all equipment on an automobile-type dashboard. *Lahey Spring & Tire Corp.* ... for more details, circle No. 245 on postcard

COMPACT MOTOR

... for vertical shaft connection

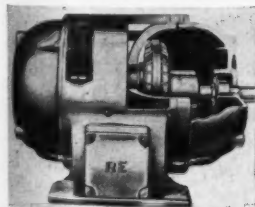


The Type HV is a new vertical solid shaft motor available with horsepower from 1 to 10 and soon to be available up to 30. Motor conforms to new NEMA standards and is furnished with NEMA style C or P base. Vertical shaft connection for directly applied power simplifies hookup and unitizes the motor with the driven machine, assuring positive alignment and quiet operation. Motor frame, brackets, canopy cap, and outlet box are of cast iron for shock and corrosion resistance. Frame is ribbed inside to accommodate prewound stator. *U. S. Electrical Motors, Inc.*

... for more details, circle No. 246 on postcard

FLEXI-SHAFT MOTOR

... uses steel shot for fluid



This Flexi-Shaft motor works on a different fluid-drive principle: it uses steel shot instead of a true fluid. It is available in the same power package as the Dodge Flexidyne drive. Its operating principle is based on centrifugal force throwing steel shot to the perimeter of the housing, which, in turn, is keyed to the load and accelerates as the rotor gradually becomes imbedded in the tightly packed shot. Available in ratings from 1/2 through 15 hp. *Reuland Electric Co.*

... for more details, circle No. 247 on postcard

Here's something

NEW

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Bond's #100 GEAR CATALOG

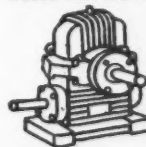
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Bond Gear Catalog #100 is NOT just a listing of available Bond Stock Gears. It provides you with the means to easily, quickly, and correctly select the right gear and the right component part for any particular application. Features include:

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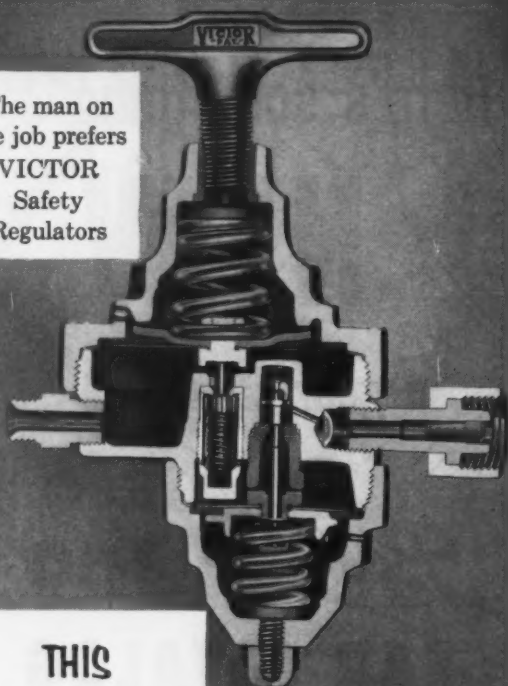
Wheel in the Window

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... for new catalog, circle No. 76 on Reader Service Postcard
See Directory listing page 87

The man on
the job prefers
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Cut-away of Model VTS400 series 2-stage Safety Regulator. Victor makes regulators for almost every gas and use, for pressures to 10,000 p.s.i., and volumes to 28,000 c.f.h.

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SINGLE AND TWO-STAGE TYPES. Victor offers single-stage regulators to meet most capacity or delivery pressure requirements; and two-stage regulators for operations which require a constant delivery pressure over a range of varying inlet pressures.

Many nationally known companies, small and large, and in all types of industry have standardized on Victor Safety Regulators because of their trouble-free operational characteristics and reliable service.

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San Francisco 7

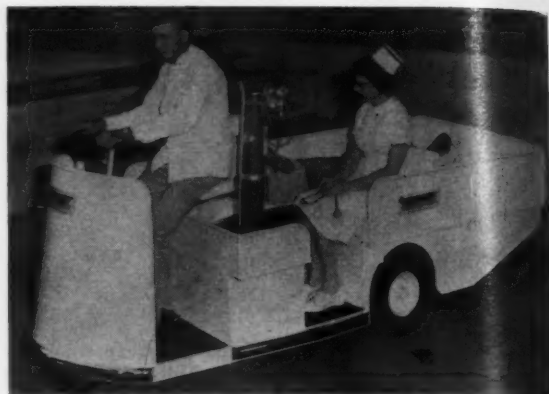
3821 Santa Fe Avenue
Los Angeles 58

... for more details, circle No. 77 on Reader Service Postcard

128

ELECTRIC AMBULANCE

... operates in narrowest corridors



The three-wheel design of this electric industrial ambulance permits a sharp turning radius and access to the narrowest corridors. Employees in need of aid can be picked up at the scene of the accident and do not have to wait or walk for aid. The car has room for a driver, attendant and the patient, along with stretcher, oxygen equipment, medical bag, etc. Cushioned tires, extra coil springing, and two shock absorbers assure a comfortable ride. Power is transferred through an automotive-type differential drive. *West Coast Machinery, Inc.*

... for more details, circle No. 248 on postcard

TIMING BELT DRIVES

... offer from flea power to 500 hp.

Timing belt drives in three new sizes now enable the Gilmer line to offer any power capacity from flea power to 500 hp. New sizes include a belt for extra light duty (Model XL), with 3/4-in. pitch and flea to 1 hp.; the Model XH with 7/8-in. pitch and horsepower varying from 10 to 200; and Model XXH for double extra heavy duty with 1 1/4-in. pitch and a horsepower range from 20 to 500. *New York Belting & Packing Co.*

... for more details, circle No. 249 on postcard

DIESEL GENERATOR

... 2,500 w. from midget 315-lb. package



The Power-Lite Model DG-2500 generator plant gets 2,500 w. of 115-v., 60-cycle power in a midget package weighing 315 lb. The manufacturer claims that the unit costs as little as half as much as a gasoline-powered unit to operate, and that it will last up to 10 times as long. The plant delivers electrical and mechanical power simultaneously through extra power take-

off sheave for driving water pump or other V-belt driven equipment. Generator operates at 1,800 rpm. and is glass insulated and moisture and fungus proofed; the engine is of one cylinder horizontal water cooled German full diesel design rated at 6 hp., four stroke cycle. No water pump, fan, or radiator is required as the flywheel serves these functions. Complete unit measures 20 x 25 x 30 in. *Lynn Engineering Co.*

... for more details, circle No. 250 on postcard

SEALED SWITCH

... handles 75-amp. inrush currents



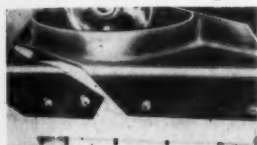
This sealed, roller plunger, high capacity switch will handle inrush currents as high as 75 amp. and is made oil-tight by special integral O-rings around the bushing and plunger and a ring-type seal between the cover and housing. Actuator is field adjustable through 360 deg. to allow operation from any direction. Switch also

has a corrosion-resistant steel roller and a heavy plunger bushing. Switch is available with actuator positioned either to the right or left. *Micro Switch Division, Minneapolis-Honeywell Regulator Co.*

... for more details, circle No. 251 on postcard

CASTER PLATES

... for safe multiple stacking



These caster stacking plates, when riveted to each corner of a truck, make possible safe multiple stacking. They have a circular rim about 1 in. deep which acts

as a guard rail for each caster on the truck stacked above. Slipping is impossible when the caster stacking plates are used. The plates have an additional advantage of affording cleanliness by preventing dirt picked up around the plant by casters from falling into trucks below. *G. B. Lewis Co.*

... for more details, circle No. 252 on postcard

NEW JOINTING BULLETIN

for faster splicing of neoprene-jacketed cable



Step-by-step instructions — amply illustrated — pocket-size.

New bulletin simplifies jointing any voltage, any conductor size, shielded or nonshielded neoprene-jacketed cable. Nine illustrations in all, instead of usual single composite drawing. Clear, easy to follow. Fits conveniently in engineer's coat pocket, splicer's hip pocket. No cost or obligation. Write for copies to: *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

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September 1956 — WESTERN INDUSTRY

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over the Rockies



Western industry is learning how to reach profitable markets in the populous Eastern half of the U. S. — the quick way — the Slick way. It has found SLICK the inexpensive way, too, with rates comparable and **OFTEN EVEN LOWER** than surface freight. West Coast manufacturers like SLICK's all-cargo service — no delays or off-loading for passengers — equipment geared to cargo — big planes, big freight doors, mechanized speedy ground handling. They like SLICK's daily, transcontinental **OVERNIGHT** flights with on-time scheduled deliveries. They like the door-to-door service, the in-flight manifest that tells at any minute where your shipment is. They like the savings SLICK provides through reduced packing, lower inventory requirements, reliable delivery for production scheduling. In short, the West likes SLICK service! Call SLICK on your next airshipment anywhere! The SLICK WAY is the QUICK WAY!

SLICK

THE AIR FREIGHT LINE
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ELECTRIC TRACTOR

... with full spring suspension

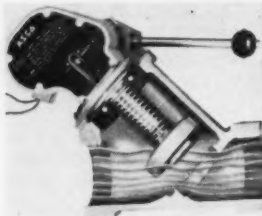


Full spring suspension, with semi-elliptic springs on both front and rear axles, cushions parts from road shocks and vibrations on this electric tractor. Called the Model 751, it has a maximum drawbar pull of 3,000 lb. and no-load speed of 7½ mph. Tractor is designed with seat at the rear so the driver can couple and uncouple trailers without leaving his seat. The tractor has automotive wheel-type steering, 16¼ x 4-in. front solid rubber cushion tires, 21 x 5-in. rear tires, and detachable wheel rims for quick tire change without disturbing bearings. Tractor drive consists of double-reduction spiral bevel and spur gear differential and full floating drive shaft. Driving wheels are equipped with internal expanding hydraulic brakes applied by pedal. *Mercury Manufacturing Co.*

... for more details, circle No. 143 on postcard

SAFETY SHUT-OFF VALVES

... for controlling flow of gases



Designed to control the flow of manufactured, natural, and L-P Gases at a maximum ambient temperature of 104 deg. F., these safety shut-off valves shut off the fuel automatically and instantly upon failure of power. They also can be used to handle various grades of fuel oil and non-corrosive liquids and gases and are available in sizes from ¾ to 6 in. ips. with pressures from 25 to 100 psi. Integral crown-type seat and soft composition disc provide absolute shut-off for all gases and liquids. The normally closed valves may be opened and closed manually if desired. *Automatic Switch Co.*

... for more details, circle No. 253 on postcard

HYDRAULIC FLUID

... has fire-resistant quality

Irus Fluid 902 is a snuffer-type hydraulic fluid with fire-resistant qualities which prevent it from burning on contact with flames, heated metal surfaces or molten metal. A special formulation of water, petroleum hydraulic oil and emulsifying agents, the fluid is particularly suitable for use in industries where hydraulic leaks or line ruptures would be fire or explosion hazards. The fluid eliminates the possibility of combustion by releasing its water content as a protective steam blanket to quench fire. The oil will continue its hydraulic action after the water is dissipated. *Shell Oil Co.*

... for more details, circle No. 254 on postcard



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You won't need them. For it doesn't matter what you want, you'll find it fast in the Yellow Pages. From raw materials to any specialized service you require ... the Yellow Pages will tell you where to call.

So look in the Yellow Pages whenever any problem comes up in your business. The chances are you'll find a complete list of qualified people anxious to help you out.

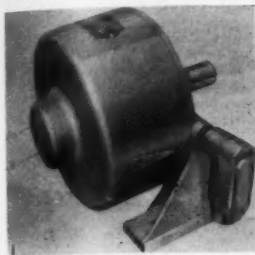
You'll find it fast in the YELLOW PAGES

 **Pacific Telephone**

... for more details, circle No. 81 on Reader Service Postcard
WESTERN INDUSTRY — September 1956

DISC TYPE BRAKE

... mounts separately from motor



This disc type brake can be mounted separately from the motor, providing the advantages of the disc brake where a direct, endbell mounted unit can't be used. The foot-mounted brake is available in two types to accommodate different shaft mountings: with its own self-contained bearings and

shaft for applications where a coupling is used between machine and brake, and without shaft to permit the extension of the machine's drive directly into the brake. *Reuland Electric Co.*

... for more details, circle No. 255 on postcard

UNITIZER

... assembles loads without pallets



The Unitizer automatically assembles unit loads of cartons or cases in desired size and shape directly from a connected conveyor without the use of pallets. Unit loads can be carried directly on conveyor or can be picked up by clamp type trucks. Unitizer works on air, hydraulic, and electrical circuits. Machine is floor mounted, and loading and unloading elevations of only 18 in. above the floor are possible. *Standard Conveyor Co.*

... for more details, circle No. 256 on postcard

TOOL BALANCERS

... accommodate suspended 50-lb. load

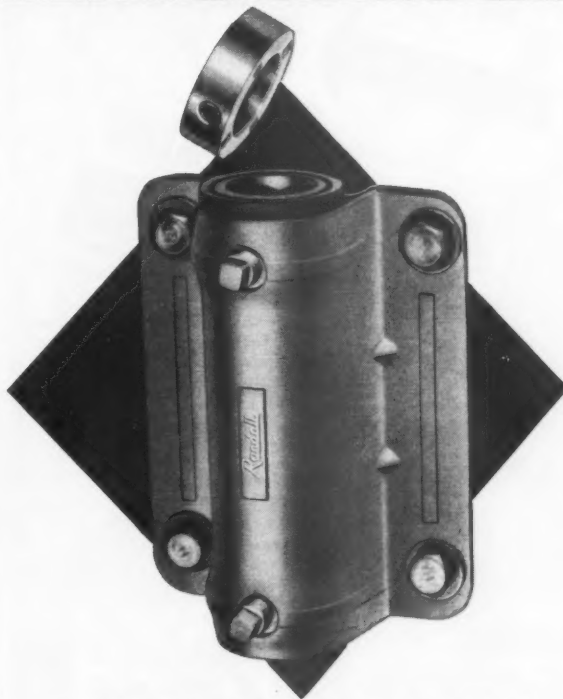


This line of tool balancers, designed to reduce wasted motion and lower operator fatigue, will accommodate any suspended load up to 50 lb. According to the manufacturer, the balancers can also cut tool maintenance costs as they prevent damage caused by dropping tools. The line includes seven models: three for suspending light tools and four for heavy-duty

service. Heavy-duty balancers have a built-in safety lock that automatically locks the cable drum under unusual conditions and prevents the tool from dropping. *Keller Tool Division, Gardner-Denver Co.*

... for more details, circle No. 257 on postcard

"new" RANDALL DUPLEX SLEEVE BEARING ASSEMBLY



specially designed for vertical or thrust loads

The first self-aligning duplex bearing assembly in the low cost field. Now—the NEW Randall Duplex Bearing Assembly offers a practical, low cost solution to many vertical or thrust load problems. It is composed of a rugged housing incorporating two Randall graphited bronze bushing "Deep-Well"® ball assemblies. A special graphited flanged bushing and unique thrust collar have been designed for vertical or thrust load applications. Available in 1/4" and 1" shaft sizes.

it gives you these outstanding features

The efficiency of this assembly has been proven by extensive testing under all operating conditions.

Completely self-aligning, self-lubricating, quiet in operation.

Pre-lubricated at the factory with Plastic Petroleum E, a

long-life lubricant which greatly reduces maintenance.

Long, trouble-free service.

Housing finished in corrosion resisting baked aluminum paint.

Lends itself to simple, low-cost mountings and blends with

functional, modern designs.

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Allan P. James Co. San Francisco, Calif.

Brown Bearing Co. Seattle, Washington

Bearing Engineering & Supply Co. Seattle, Wash.

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BRONZE BUSHINGS

PILLOW BLOCKS

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THRUST WASHERS

SAFETY COLLARS

BRONZE CASTING



RANDALL GRAPHITE BEARINGS, INC.

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See Directory listing page 100

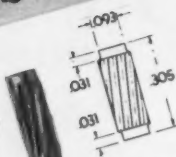
131



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CASE
HISTORY
36

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Rapistan®

MATERIALS HANDLING EQUIPMENT

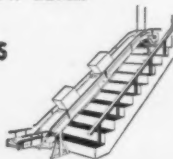


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- Aluminum & Steel
- Flow Rack

POWER CONVEYORS

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- Portable Belt
- Overhead Chain



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Cold-forged & Steel-forged

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SAN FRANCISCO Rapistan of California, Inc.,
Yukon 2-3880, 444 Brannan St., San Francisco 7, Calif.

SEATTLE Air-Mac, Inc. of Washington, MU 3388,
3838 4th Ave., S., Seattle 4, Washington

PORTLAND Air-Mac, Inc. of Oregon, Elmore 6524,
1435 S.E. Union Ave., Portland 14, Oregon

... for more details, circle No. 84 on Reader Service Postcard

HYDRAULIC LIFT TABLE

... for tool and die, plant maintenance work



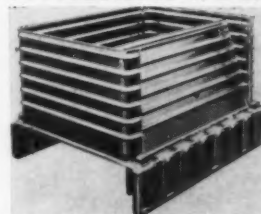
A small battery-powered hydraulic lift table designed for tool and die makers and plant maintenance departments has a capacity of 2,000 lb. and is portable. It is adapted from a mechanical hand crank model with a hydraulic ram replacing the Acme thread screw. The ram is powered by a battery

hydraulic power unit composed of a rotary gear pump with a 12-v. d-c. motor and two series connect 6-v., 130-amp./hr, 19 plate batteries. It has a built-in 8 amp./hr. trickle charger with cut-out switch. Deck of the table is 26 x 43 in. and height range is from 28 to 42 in. at a lifting speed of 11 ft. per min. *Colson Corp.*

... for more details, circle No. 258 on postcard

MATERIALS HANDLING BOX

... reduces to 1/5 original size



Eliminating some of the space needed to store and ship empty boxes, this fold-away materials handling box can be reduced to one-fifth of its original size. Made of corrugated steel, the box has collapsible sides which are easily set up or

folded down. Sides are locked by a pin and slide bolt arrangement, giving the box rigidity. It is handled equally well with fork or platform truck. *Republic Steel Corp.*

... for more details, circle No. 259 on postcard

Get new
savings in
time -
money -
manpower



ELECTROLIFT

WORM DRIVE HOISTS

Put this three-way saving to work in your own operations with ElectroLift Worm Drive Hoists. Designed in capacities up to ten tons, ElectroLift moves materials faster, more economically with less effort. Its efficient, long service saves its initial cost many times over.

Here's what make the fully-enclosed ElectroLift

hoists outstanding: automatic electric brake, steel suspension, worm drive braking, grooved drum, alloy-steel worm shaft, automatic lubrication, optional controls, and many special features.

For complete details, consult your ElectroLift representative listed in the telephone directory.

ELECTROLIFT

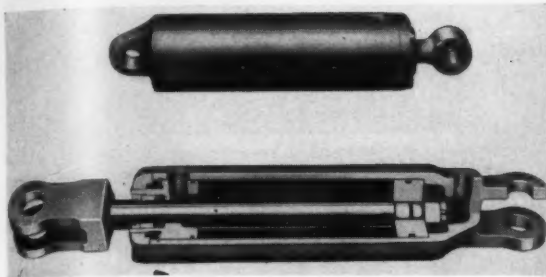
3773

ELECTROLIFT, INC., 204 Sargeant Ave., Clifton, N. J.

... for more details, circle No. 85 on Reader Service Postcard
WESTERN INDUSTRY — September 1956

HYDRAULIC CYLINDER

... with pre-stressed snap ring



A special feature of these heavy-duty hydraulic cylinders is the pre-stressed snap ring, which has the gland drawn tightly against it to prevent it from working and wearing the snap ring groove. Gland is held against the snap ring by screwing the cap on the threaded portion of the gland. This method of pre-stressing permits easy maintenance and assures perfect rod alignment, according to the manufacturer. Cylinders are honed seamless steel tubing with welded cast steel cleves. Design of the cleves prevents cylinder distortion during welding. Cylinders are available from 2½ in. through 4-in. bore and from 1 in. through 18-ft. stroke. and are designed to operate up to 1,500 psi. *Densmore Engineering Co., Inc.*

... for more details, circle No. 260 on postcard

EPOXY RESIN ADHESIVE

... needs no accelerator or catalyst

A one-part epoxy resin adhesive provides high shear strengths without adding an accelerator or catalyst, according to the manufacturer. Designated the EC-1386, this adhesive eliminates the difficulties sometimes associated with two-part adhesives, such as human error in mixing operations. This liquid adhesive is designed for metal bonding over a service temperature range of -65 to 250 deg. F. It gives good adhesion to brass, steel, aluminum, and can be used for industrial and aircraft applications where high shear strengths at room temperatures and 180 deg. F. are required. No volatile by-products are given off during the curing cycle. *Adhesives & Coatings Division, Minnesota Mining & Manufacturing Co.*

... for more details, circle No. 261 on postcard

FLOOR MACHINE

... shaves off dirt, cleans in one operation



A 25-hp. hydraulically equipped floor machine shaves off and picks up grease-caked dirt in a single operation. Operated by one man, it propels itself, cleans a 21-in. patch in a single pass, and according to the manufacturer, has a capacity of 4,000 to 5,000 sq. ft. per hr. The operator rides on the rear platform, operating the machine by simple hand controls. Faucet-type valves allow control of machine speed, which is a maximum of 3 mph. forward and reverse, and pressure on the rotating cleaning cylinder. Cleaning action is provided by a heavy gage wire 21-in. brush cylinder revolving at 1,600 rpm. As it rotates it shaves off soilage and throws dirt into a hopper. A 2,400 rpm. fan aids soilage pickup. *G. H. Tennant Co.*

... for more details, circle No. 262 on postcard

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SCIENTIFIC**

When the **HEAT's** on



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"SERV-RITE"
thermocouple
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For your fast, convenient service, Pacific Scientific is now stocking precision quality thermocouple supplies by Claud S. Gordon Co.

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AND INSTRUMENTS SINCE 1919**

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Roller Chains
Sprockets
Sheaves
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Solves
YOUR LONG PARTS
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Everyone who stores any kind of bar stock has a problem that Petley engineers (schooled for years in solving storage matters) can clear up most efficiently...



WEDGE-LOCK LONG PARTS BAR RACKS

are flexible enough to handle any type of bar stock and they're built especially strong to support the heavy loads and last practically forever.

Give us the opportunity to survey your premises, submit layouts, and finished drawings, and give you the accurate costs of the installed shelving—in its right place—to fit your particular needs.

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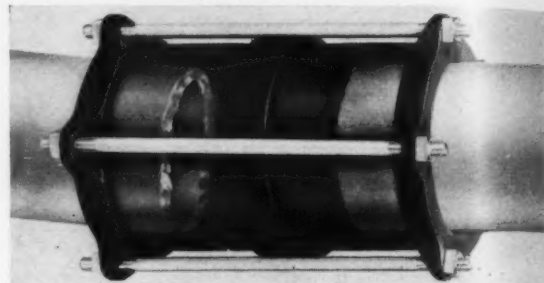
5424 E. Slauson Ave., Los Angeles 22
Phone: RAYmond 3-3327

... for more details, circle No. 88 on Reader Service Postcard

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CUT-IN COUPLING

... for repairing pipeline breaks



The Series 4K flexible cut-in coupling for repairing misalignment breaks in water, gas, or oil pipelines is applicable to cast iron, asbestos-cement, or steel pipe and is installed with the pipe in place. It acts as a double coupling replacing twice the length of pipe cut out. A special feature is a dual sleeve plus a centering ring. When the break in the pipe is cut out sufficiently for one sleeve to be placed, all parts of the cut-in coupling are assembled to repair-connect the pipe while in place. Cut-in coupling consists of two sleeves, two gaskets, two flanges, and a centering ring with gaskets which are tightened on the pipe with through bolts. *Smith Blair.*

... for more details, circle No. 263 on postcard

MOBILE CRANE

... with capacity of 10,000 lb.



The KE Karry Crane is a newly designed mobile crane with 10,000 lb. capacity and power steering as standard equipment. It also has trunnion type steering wheels, short turning radius and rounded rear end design which enables the unit to maneuver easily and quickly in crowded areas. Boom lengths are adjustable to six positions while hydraulic power topping is

available for raising and lowering the boom. Unit is operated with automotive type driving controls and one spring-loaded lever to operate the hoist drum which, when released, automatically returns to neutral engaging a brake to hold the load. Load lifting speed is 75 to 108 fpm. while lowering speed is 165 to 240 fpm. *Hyster Co.*

... for more details, circle No. 264 on postcard

H. N. COOK BELTING CO.

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SAN FRANCISCO 5

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HYDRAULIC LEATHERS

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HOSE

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HYDRAULIC HOSE
AND FITTINGS

CHAIN & SPROCKETS

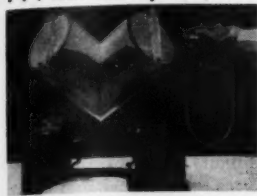
... for more details, circle No. 89 on Reader Service Postcard

See Directory listing page 89

WESTERN INDUSTRY — September 1956

LIQUID-FEED BLENDER

... mixes liquids, solids in one operation



This liquid-feed blender for commercial processing blends liquid and dry materials quickly in one operation. Designed as an integral part of the firm's twin shell blender, the liquid-feed modification makes it possible to feed liquids evenly into dry materials during blending. The new device consists of an intensifier bar which revolves inside the twin shell blender. Liquid flows from a hollow feeder tube within the bar onto a revolving offset disc. Liquid droplets are flung from the edge of the revolving disc by centrifugal force and effective dispersion is achieved. *Patterson-Kelly Co.*

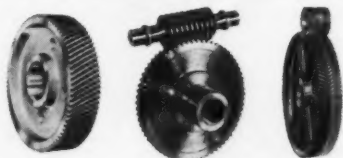
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INDUSTRIAL ADHESIVES

... for assembly line operations

A line of industrial adhesives, protective coatings, and sealers is available for assembly line operations in a wide range of industries. The adhesives will bond a large variety of materials and are resistant to very low and very high temperatures. They may be applied by any commonly used method. Comprising both thermosetting and thermoplastic types, the compounds are based on synthetic or natural rubber, resin bases of all types, and combinations of rubbers and resins. They have the ability to resist temperatures ranging from -80 to 700 deg. F. Ray-Bond adhesives may be used with wood, metal, plastics, glass, ceramics, friction material compounds, paper, insulation materials, and rubber. *Raybestos-Manhattan, Inc.*

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50 YEARS GEAR SERVICE TO INDUSTRY

The More Particular You Are In
Selecting Gears, The More Likely
You Are To Select JOHNSON

**JOHNSON GEAR
AND MANUFACTURING CO.**

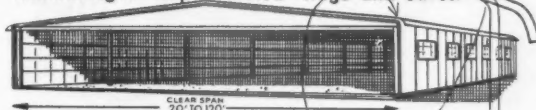
8th & PARKER STREETS
BERKELEY 10, CALIFORNIA



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See Directory listing page 95
September 1956 — WESTERN INDUSTRY

EMPIRE *First! again! with!* COLOR!!!

- PRE-ENAMELED "Empire" aluminum roof and sidewall panels with permanent baked-on enamel finish in all standard colors.
- PRE-ENGINEERED custom buildings at standard prices. Available in aluminum or steel, bolted or riveted construction.
- Die-FORMED "Empire" panels (not corrugated) with rolled weather-tight "Empire sealed" ridge and eaves.



- PRE-ENGINEERED clear span girders or standard rigid frames—20' to 120'. Greater widths readily available.
- ALL TYPES of steel, aluminum, masonry, pre-cast tilt-up concrete, and concrete buildings, with 100% financing available, at low cost.
- ALL WORK performed under one contract.
- WE INVITE your inquiry regarding your special requirements.

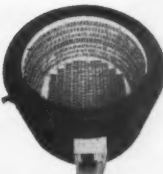
FACTORIES	MARKETS	GRANARIES	GARAGES
WAREHOUSES	HAYSHEDS	MILLS	INDUSTRIAL
HANGARS	DAIRY BARNs	STORAGE	COMMERCIAL

EMPIRE STEEL BUILDING COMPANY
Capitol 2-9181 2137 MARIANNA AVE., L.A. 32, CALIF.

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TRENT "Folded-and-Formed" HEATING UNIT

... for High Temperature Application
where "Sheath-Type" Heaters Fail!



The only packaged "non-sheath" type electrical heating element competing directly with fuel fired equipment for temperatures up to 2000° F. Trent "Folded-and-Formed" Heaters now offer advantages not possible with any other type electrical heating unit!

ADVANTAGES—Compact, Space Saving Design • Longer Element Life • Maximum Radiating Surface Area • High Watt Density • High Temperature Uniformity to 2000°F. • Low Thermal Inertia • High Dielectric Strength (600V) • Pin Point Control • All-welded Connections • Unity Power Factor • Direct Fired Element • Eliminates Heat Exchangers, Pipe Networks, etc. • Uniformity Equivalent to Liquid or Vapor Jackets • Economical Installation and Maintenance

APPLICATIONS—Kettles • Air and Duct Heating • Furnaces • Ovens • Reactors • Jackets and Autoclaves • Pipe Lines

Before you design or install high temperature heated equipment, discuss your requirements with a Trent heating engineer. He'll show you how the outstanding features of Trent "Folded-and-Formed" Heating Units can mean greater efficiency and higher production for your application. Write for complete literature on Trent Kettles, Jackets, Ovens, Furnaces and Heating Elements.

Trent Representatives in
Principal Cities
Coast to Coast

TRENT INC.

Electrically Heated Industrial Equipment
242 LEVERINGTON AVE. PHILA. 27, PA.

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STEEL
Stanho
PRODUCTS

FLAT BOTTOM
WOODRUFF
KEYS

MACHINE
KEYS

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the Quality Line

of Precision Made Steel Products

KEYS—ALL TYPES • COTTER PINS
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MACHINE RACK • SPECIAL PARTS

KOOLHEAD Foundry Chill Nails

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NEW BRIGHTON, PA.

Western Factory Sales Representative
GREYER & GREYER, P. O. Box 47, Stockton, California
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SURETY GRIPTITE
ROUGH FINISH COATED FABRIC
WORK GLOVES

**RESISTANT TO OILS,
ACIDS, CHEMICALS,
CUTTING, SNAGGING
AND ABRASION**

**NO SIDE SEAMS
OR THUMB SEAM
TO RIP OR WEAR OUT**

Now, **A POSITIVE GRIP**
**IN OIL, GREASE, GASOLINE,
ACIDS AND SOLVENTS**

Combining a vinyl base with a Sureseal rough finish, Surety Griptites achieve the qualities for long life and a claw-like grip. Here's comfort, service and safety that keep glove costs reasonable. Send for bulletin.

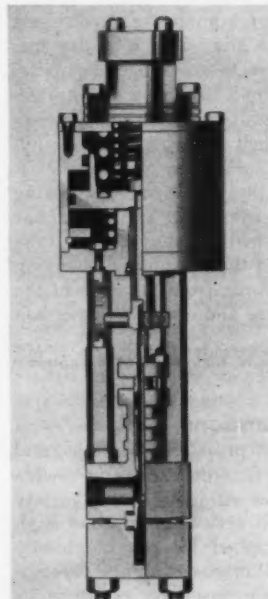
THE **SURETY** RUBBER COMPANY
Dept. A
Carrollton, Ohio
In Canada:
Safety Supply Co., Toronto

... for more details, circle No. 94 on Reader Service Postcard

136

FLOW CONTROL VALVE

... for working pressures to 6,000 psi.

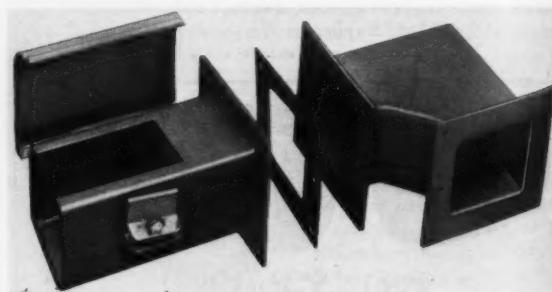


This is a new line of small control valves designed for working pressures to 6,000 psi. and using Annin's 600 Series differential area Domotor operator. Differential area piston eliminates need for load regulator and will stroke fully in either direction in .75 sec. or less. Valves have offset globe or angle bodies with body sections which rotate in 90° increments for piping convenience. Annin Co.

... for more details, circle 267 on postcard

OIL TIGHT RACEWAY

... with complete line of fittings



A complete line of fittings is available for bolting this oil tight raceway together to fit almost any machinery or building requirement. Raceway is 2½ x 2½ and 4 x 4 in. square and comes in various lengths up to 10 ft. Trough has a hinged cover allowing access to the interior of the full length of each section. Sheet steel of 14 gage is used throughout except on the welded connection flanges, which are made of 11-gage steel. Finish is gray hammertone enamel. Hoffman Engineering Corp.

... for more details, circle No. 268 on postcard

✓ **check**

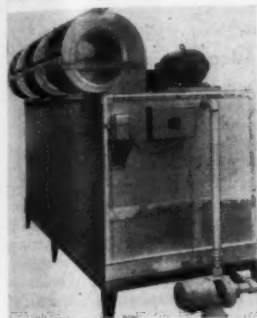
the many advantages of

SORBOCAST
CAST IRON
DAYTON FOUNDRY
Hollydale, Calif. • NEvada 6-1251

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WESTERN INDUSTRY — September 1956

COOLING TOWERS ... with automatic modulating dampers



Recold Dri-Fan cooling towers are available with automatic modulating dampers for control of water temperature. Dampers provide a method of adjusting the capacity of the unit to match the capacity of the compressor when the system is operating at any condition from full to minimum capacity. Dampers may be controlled by a thermostat which operates a modulating damper motor. An end switch cuts off the motor when the dampers are completely closed, regulating air through the tower and keeping water temperature constant. *Refrigeration Engineering, Inc.*

... for more details, circle No. 269 on postcard

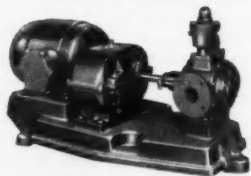
PROXIMITY SWITCH ... keeps tabs on moving metal parts

A magnetic detective switch has been designed to keep tabs on moving metal parts, locating objects containing iron on assembly lines, in liquids, and in the moving parts of automatic machine tools. The switch itself has no moving parts and no physical contact with the work piece is required. Detection is accomplished by the object's passing through a magnetic field set up directly in front of the switch's sensing end. A signal flows through the magnetic circuitry of the switch and operates a remotely located electrical control relay. *Doelcam Division, Minneapolis-Honeywell Regulator Co.*

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"NEW PUMP" PERFORMANCE

*after years
of service*



with BLACKMER rotary pumps

Here's how you can restore "new pump" efficiency at a fraction of the cost of a new pump, thanks to Blackmer engineering and design.

REPLACEABLE LINER It takes only a matter of minutes to replace the liner of a Blackmer Pump after excessive wear has been caused by the handling of corrosive or abrasive materials.

REPLACEABLE VANES The vanes in Blackmer Rotary Pumps are self-adjusting for wear and give sustained efficiency over years of service. In case of extreme wear or damage, they can be replaced quickly, using only simple hand tools.

Blackmer Rotary Pumps are handling hundreds of liquids and semi-solids successfully.



liquid materials handling®
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Industrial, Hand and Truck Pumps, Strainers, Pressure Control Valves
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GRAND RAPIDS • DALLAS • WASHINGTON • SAN FRANCISCO
See Yellow pages for your local sales representative

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September 1956 — WESTERN INDUSTRY

— — — — — why speculate? specify — — — — — STATE TUBE to be sure!

Every element of chance has been eliminated through careful inspection and quality control on each length Play it safe with "STATE".

COLD
ROLLED
TUBING
ELECTRIC
WELDED

Manufacturer of top quality steel tubing in both plating and painting grades. Sizes include 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 3 1/2", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48", 60", 72", 84", 96", 108", 120", 144", 168", 192", 216", 240", 288", 324", 360", 408", 456", 504", 576", 648", 720", 800", 864", 936", 1008", 1080", 1152", 1224", 1296", 1368", 1440", 1512", 1584", 1656", 1728", 1800", 1872", 1944", 2016", 2088", 2160", 2232", 2304", 2376", 2448", 2520", 2592", 2664", 2736", 2808", 2880, 2952, 3024, 3096, 3168, 3240, 3312, 3384, 3456, 3528, 3600, 3672, 3744, 3816, 3888, 3960, 4032, 4104, 4176, 4248, 4320, 4392, 4464, 4536, 4608, 4680, 4752, 4824, 4896, 4968, 5040, 5112, 5184, 5256, 5328, 5400, 5472, 5544, 5616, 5688, 5760, 5832, 5904, 5976, 6048, 6120, 6192, 6264, 6336, 6408, 6480, 6552, 6624, 6696, 6768, 6840, 6912, 6984, 7056, 7128, 7200, 7272, 7344, 7416, 7488, 7560, 7632, 7704, 7776, 7848, 7920, 7992, 8064, 8136, 8208, 8280, 8352, 8424, 8496, 8568, 8640, 8712, 8784, 8856, 8928, 9000, 9072, 9144, 9216, 9288, 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19728, 19800, 19872, 19944, 20016, 20088, 20160, 20232, 20304, 20376, 20448, 20520, 20592, 20664, 20736, 20808, 20880, 20952, 21024, 21096, 21168, 21240, 21312, 21384, 21456, 21528, 21600, 21672, 21744, 21816, 21888, 21960, 22032, 22104, 22176, 22248, 22320, 22392, 22464, 22536, 22608, 22680, 22752, 22824, 22896, 22968, 23040, 23112, 23184, 23256, 23328, 23400, 23472, 23544, 23616, 23688, 23760, 23832, 23904, 23976, 24048, 24120, 24192, 24264, 24336, 24408, 24480, 24552, 24624, 24696, 24768, 24840, 24912, 24984, 25056, 25128, 25200, 25272, 25344, 25416, 25488, 25560, 25632, 25704, 25776, 25848, 25920, 25992, 26064, 26136, 26208, 26280, 26352, 26424, 26496, 26568, 26640, 26712, 26784, 26856, 26928, 27000, 27072, 27144, 27216, 27288, 27360, 27432, 27504, 27576, 27648, 27720, 27792, 27864, 27936, 28008, 28080, 28152, 28224, 28296, 28368, 28440, 28512, 28584, 28656, 28728, 28800, 28872, 28944, 29016, 29088, 29160, 29232, 29304, 29376, 29448, 29520, 29592, 29664, 29736, 29808, 29880, 29952, 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HOW TO PROTECT PIPE, PIPE JOINTS, TANKS AND COUPLINGS AGAINST CORROSION



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TAPECOAT
the Quality Coal Tar
or Asphalt Coating
in Handy Tape Form

There's no need to gamble in fighting corrosion. Since 1941, TAPECOAT has proved its ability to give lasting protection on pipe, pipe joints, couplings, conduit, cable and insulated piping—above or below ground. Its resistance to moisture, acids, alkalis, electrolysis, salt water and other severe corrosive and abrasive conditions has established TAPECOAT as the time-tested quality protection to cut maintenance and replacement costs.

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For details on your specific needs, call our nearest distributor.

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Phone: EL 5-141

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Company

Originators
of Coal Tar and
Asphalt Coatings
in
Tape Form

1563 Lyons Street
Evanston, Illinois

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WESTERNERS AT WORK ...

McCulloch Motors Corp.



G. Eichelsbach

... has named **George Eichelsbach, Jr.**, as works manager. He will be responsible for manufacturing operations of the Los Angeles firm, including production, planning, purchasing, tool engineering, and plant engineering. Eichelsbach was formerly with Magic Chef, Inc., for 21 yr.

Garrett Corp.

... has appointed **Frank Nelson** to the newly-created position of manager of industrial supply operations. Nelson was former manager of the Garrett supply division and was also in charge of C. W. Marwedel, a San Francisco subsidiary. **Robert Daniels**, former assistant manager, will be the new manager. **Jack Hardy** has been appointed assistant manager and **Glen Crandall** sales manager. **W. D. Smith** has been appointed sales manager for the Marwedel firm.

Vickers, Inc.

... has appointed **Charles W. Newman** manager of its Northwest branch. He will have his offices in Seattle, Wash., and will be in charge of warehousing and service facilities. He will also direct the activities of the Seattle district sales office.

Tidewater Oil Co.

... has made **James A. Ransford** manager of wholesale sales of its Western marketing division. He will be responsible for industrial, farm, commercial, and marine sales, as well as for special product sales and technical service to the firm's customers. **J. Earle Gray** has been appointed assistant general manager of the Western division. He will assist the general manager in conducting and coordinating drilling, refining, marketing, and transportation activities of the firm in seven Western states.

Connor Spring Manufacturing Co.

... has named **Marshall W. Christen** manager of the Los Angeles division. He has been assistant manager for the past 6 yr. Prior to that he was associated with several West Coast industrial firms.

Westinghouse Electric Corp.



W. L. Moats

... has appointed **William L. Moats** distribution apparatus sales manager for its Pacific Coast region. He replaces **Willis L. Winter**, who has been appointed to the staff of Vice President **Walter J. Maytham** to handle special assignments. Moats has been area sales manager for Westinghouse since 1951.

North American Aviation, Inc.

... has named **R. H. Rice**, vice president and director, as general manager of its Los Angeles division. **R. H. Ruud**, manufacturing manager, has been appointed assistant general manager of the same division. **J. S. Smithson**, also a vice president and director, has been named vice president-administration with responsibility for corporate facilities planning, manufacturing programming, procedures coordination, and organization planning. **N. S. Houston**, director of management control, has been appointed director of procedure coordination and organization planning in the office of the vice president-administration. Other appointments include **W. F. Snelling** as factory manager, **G. S. Honey** as director of personnel, and **H. E. Harris** as director of quality control. In the missile development division **Mark A. Starr** has been appointed director of material. Autotronics' appointments include that of **C. R. Rajtery** as director of material and **Joseph A. Geisler** as assistant factory manager.

Holz Rubber Co., Inc.



N. R. Crum

... has named **Newton R. Crum** as vice president and sales manager of its industrial rubber products manufacturing plant in Lodi, Calif. He formerly represented several eastern firms in California and Arizona.

Weber Aircraft Corp.

... has named **Arnold Johnson** as senior vice president and **Fred Godfrey** as vice president of manufacturing. Johnson joined Weber when it was Weber Showcase & Fixture Co. in 1923 and worked up to vice president of manufacturing in 1951. Godfrey joined Weber in 1948 and has been plant superintendent, production manager, and director of manufacturing.

W. P. Fuller & Co.

... has established a new marketing division, which will be under the direction of **W. P. Fuller, III**, vice president of the firm. **C. E. Ide** will take over the newly-created position of director of sales, paint, and allied products about the first of the year. Vice President **H. S. Margetts** will be in charge of operations of the new division; this will include responsibility for the branch system of offices and warehouses throughout the West, Hawaii, and Alaska, as well as the manufacturing, technical development, and engineering departments.

Standard Wire & Cable Co.

... has appointed **John M. Cooner** as general sales manager. He will also serve in the same capacity for an affiliate company, **Bucky Harris Co.** Cooner joined Standard in 1951 and has been in the sales department. He will be in charge of the entire sales force in Los Angeles, Seattle, and San Francisco.

Weber Aircraft Corp.



C. E. Heimstadt

... has named *C. E. Heimstadt* plant superintendent. He has been general fabrication foreman for the Burbank, Calif., aircraft components manufacturer for the past 5 yr. Prior to that he was foreman of the machine shop.

Wilwite Associates

... has appointed *Richard Gregory* to the sales department. He will take over sales in the Northern California territory and will devote much of his time to sales promotional activities.

Hooker Electrochemical Co.

... has announced two promotions at area chemical sales offices. *John K. Gallagher* has been appointed district sales manager for California, while *H. McIntosh Beatty, Jr.*, has been appointed technical service representative at Tacoma, Wash. Gallagher has worked in the sales department since 1941. Beatty started with Hooker in 1955 and was recently transferred to the sales department. *Evan E. Graham* has been promoted to district sales manager in California for Hooker's Durez Plastics Division.

Norris-Thermador Corp.

... has appointed *Stuart S. Power* manager of evaporative cooler sales. He will supervise nationwide sales of the firm's line of coolers. Before joining the Los Angeles firm eight months ago, Power was with Admiral.

Solar Aircraft Co.

... has named *Walker G. Dollmeyer* to the newly created position of vice president of operations. He has been vice president in charge of manufacturing and a director of the Toledo Scale Co. in Toledo, Ohio. Dollmeyer will direct Solar's manufacturing operations at the main San Diego plant, San Diego airframe parts plant, and an eastern plant.

Drake Steel Supply Co.

... has named *K. A. Saunderson* as customer service manager, a newly created post at its Los Angeles plant. *Robert Bushey* has taken over the duties of manager of inside sales.

Bemis Bros. Bag Co.

... has announced a new organizational plan for its Western operations, whereby sales and production will be separated. Two new positions have been established and filled. *A. B. Williams*, Vancouver, Wash., manager, has been appointed manager of sales for the Western operations, while *E. M. Proctor*, Seattle manager, has been appointed manager of production for Western operations. Regional sales managers appointed include *W. W. Lucke*, Seattle; *F. W. Ayers*, Portland and Vancouver; *A. H. Silvernail, Jr.*, San Francisco; and *L. L. Conrad, Jr.*, Los Angeles. Plant production managers include *J. D. Richards*, Seattle; *J. M. Prudhomme*, Vancouver; *F. W. Peters*, San Francisco; and *C. S. O'Brien*, Wilmington.



RAILWAY CAR WRECKED...

but CARGO
SAFE!
PROTECTED
by
STANLEY
HEAVY DUTY



STEEL STRAPPING

A spectacular accident, yes! But also a very conclusive demonstration of the shipping security provided when your product is "Uni-Tied" with Stanley Heavy Duty Steel Strapping. A freight car carrying valuable carbon electrodes shipped by the National Carbon Co. was wrecked but the contents were undamaged. Stanley Heavy Duty Steel Strapping secured the load... insured its safe arrival against even the most extreme hazards of handling and shipping.

Make sure YOUR product arrives **SAFE** even under unusual circumstances. Mail coupon for literature giving complete information about Stanley Heavy Duty Steel Strapping for carbanding and the Stanley "Uni-Tie" method... and request an on-the-spot demonstration by the Stanley Steel Strapping Specialist.



INSURE IT - SECURE IT WITH STANLEY STEEL STRAPPING

STANLEY STEEL STRAPPING

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Stanley Steel Strapping
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Dept. 1, 1213 Lake St., New Britain, Conn. Telephone: BAldwin 9-2021

☐ Please send literature on Stanley Heavy Duty Steel Strapping for carbanding and Stanley "Uni-Tie" Method.

☐ Have Representative call.

NAME _____

POSITION _____

COMPANY _____

CO. ADDRESS _____

CITY _____

ZONE _____

STATE _____



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...for more details, circle No. 100 on Reader Service Postcard

First with a '60'!
First with a '66'!



C&D



**BOOSTS BATTERY CAPACITY
AGAIN—to meet rising
production standards**

No more "tired" batteries toward the end of the day! No more slow-downs before the shift is over!

First to increase battery capacity and establish the 60 ampere hour standard back in 1945—C & D is first again with an additional power boost. The Slyver-Clad® 'HA' now packs 10% extra capacity (66 A. H.) in the standard-size 60 A. H. tray. C & D's Slyver-Clad 'HB' packs 125 A. H. in the standard-size 100 A. H. tray.

Advantages are obvious. Your trucks work longer . . . stronger . . . can handle all the accessories you need. You have power to spare—all during the shift!

Read all the details in Bulletins IT-517/Rev. 56 and IT-520/Rev. 56. Write for copies today!

C&D WEST COAST OFFICES

Seattle—Industrial Products Co., 2011 First Avenue, S.
Portland—Pacific Battery Mfg. Co., 427 N.E. Cook St.
San Francisco—McCormick-Morgan, 725 Second St.
Los Angeles—F.H. Pelletier Co., 1014 Venice Blvd.
La Jolla, Calif.—Frank T. Butler, 722 Fern Glen
Denver—Howard Toncray, 1732 Blake St.

C&D BATTERIES, INC.
of Conshohocken, Pa.

INDUSTRIAL BATTERIES SINCE 1906

SALES AND SERVICE OFFICES
IN PRINCIPAL CITIES FROM COAST TO COAST
...for more details, circle No. 101
See Directory listing page 87

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Black & Decker Manufacturing Co.

. . . a Towson, Md., firm, has appointed **Lester C. Kaefer** Pacific Coast regional manager. He was formerly Los Angeles industrial-automotive district manager for the portable electric tool company. Kaefer will be in charge of sales in California, Oregon, Washington, Arizona, Nevada, and Western Idaho and Montana. He succeeds **John P. Spain**, who was promoted to the newly-created post of sales manager, service division.

Northrop Aircraft, Inc.

. . . has made **Harold E. Herdrich** director of master planning. He will report to **C. Hart Miller**, vice president in charge of administration. Herdrich was formerly staff assistant to the president and prior to that, assistant manager of industrial and plant engineering.

Alco Products, Inc.

. . . has appointed **John A. Langford** to its Los Angeles sales staff. He will handle the firm's complete line, including railroad locomotives, thermal products, and ordnance materials.

Drayer-Hanson

. . . has made **Harvey Lange** a sales application engineer. Lange, who has just joined the firm, has completed a special projects assignment in the design-development section and has been transferred to the commercial division. His duties will be in OEM and commercial refrigeration sales.

Diehl Manufacturing Co.

. . . has made **Donald O. Nelson** West Coast factory representative. He will handle the Somerville, N. J., firm's line of a-c and d-c servomotors, tachomotors, and high accuracy resolvers. Nelson's headquarters will be in Los Angeles.

Industrial Asphalt

. . . has employed **Emmett J. Woodward, Jr.**, as its chief engineer, working out of the Los Angeles office. Woodward will be in charge of seeing that customers get properly engineered materials for any type of paving job or special specifications, and he will consult with customers on unusual jobs requiring special engineering. Industrial operates 17 asphalt plants in Southern California.

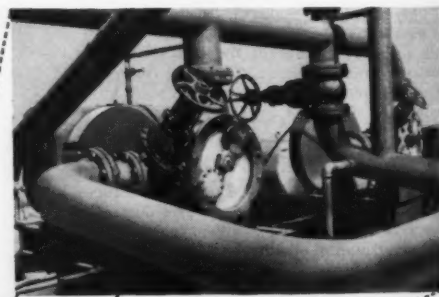
Marman Products Co., Inc.

. . . has appointed **William Willis** engineering manager. His duties will include direction of the firm's engineering program, responsibility for product research and development functions, and related staff activities. The Los Angeles firm is a subsidiary of Aeroquip Corp., Jackson, Mich.

Virtue Bros. Manufacturing Co.

. . . has appointed **Joseph H. Skidmore** to the post of vice president in charge of production. He has had 15 years of experience in the fields of heavy machinery, metals, and metallurgy. He was formerly plant manager at Virtue.

**MILLION-
GALLON
WEEK-
ENDS...**



...are just part
of the pumping job
at this terminal

LAKE River Terminals, Inc., Argo, Illinois, is a 42,000,000 gallon barge terminal for petroleum and other products. A typical week-end for them includes unloading and complete stripping of four barges in 43 hours by two Viking pumps. Total capacity is 1,000,000 gallons. Besides

those, the Terminal has two Viking 6-inch pumps and a battery of five 2-inch Vikings. You see, Vikings are kept busy helping in the successful operation of the Terminal. Vikings like tough pumping jobs like this. If you have a pumping problem, write for Bulletin 565a.



VIKING PUMP COMPANY Cedar Falls, Iowa, U.S.A.

In Canada, it's "ROTO-KING" pumps

Pacific Coast Distributors: **E. E. Burton**, 4432 Long Beach Ave., Los Angeles 68, Calif.,
DeLaval Pacific Company, 201 E. Millbrae Ave., Millbrae, Calif.
See our catalog in Sweets

...for more details, circle No. 102 on Reader Service Postcard

WESTERN INDUSTRY — September 1956

Yale & Towne Manufacturing Co.

... has appointed **Eric B. Insley** manager and **James N. McEntee** sales manager of its newly-formed materials handling division Los Angeles sales and service branch. The



E. B. Insley



J. N. McEntee

two men have been associates in the Insley-McEntee Equipment Co., a Yale sales and service representative in the east. The two men bring a total of almost 20 years of experience in materials handling equipment to their new posts.

Union Oil Co.

... has appointed **John W. Towler**, manager of its Los Angeles refinery, to the newly-created position of director of manufacturing. He has also been manager of the firm's Oleum refinery on San Francisco Bay. **W. T. Jameson**, assistant manager at the Los Angeles refinery, will become manager.

American Liquid Gas Corp.



R. D. Becker

... has appointed **Robert D. Becker, Jr.**, as sales manager of the carburetion division. He has been with the Los Angeles L-P Gas carburetion equipment firm for seven months and has worked for the carburetion division. Becker's background includes retail merchandising

of tractor and farm equipment and motor trucks.

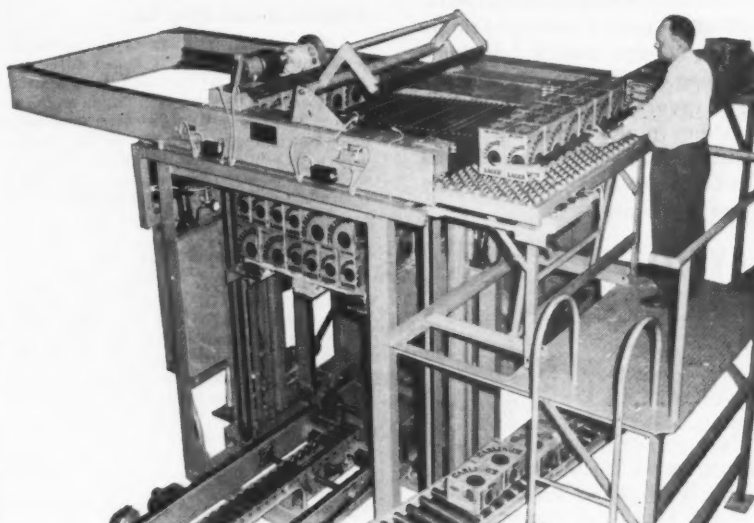
General Electric Co.

... has named **A. F. Dobbrott** Pacific Northwest sales representative for its metallurgical products department, Detroit. Dobbrott is a 27-year veteran of carbide applications, including engineering and sales in both metalcutting and mining operations. He will make his headquarters in Seattle, Wash. Before joining the then Carboloy organization in 1928, Dobbrott was superintendent of Rockwell-Barnes' metal division. He joined General Electric as a salesman, later becoming district manager, special products development engineer, and manager of mining tool sales. He is considered one of the country's foremost authorities on carbide cutting tools for machining metals, wood, and for mining operations.

Pack River Lumber Co.

... has filled two newly-created positions at its Sandpoint, Ida., headquarters. **William Ellersick** has been named manager of the firm's Bonners Ferry and Colburn sawmills, while **Phil Cook**, resident sales manager for the past two years, has been named manager of the Dover planing mill and dry kilns.

Can you use 50 Years Experience in Mechanized Handling?



New Mathews Semi-Automatic Pallet Loader developed for the food and beverage industries.

Just over 50 years ago, the first Mathews Conveyers were designed and built—and from that very early equipment has evolved some really spectacular continuous-flow conveying systems—indeed, some of the "show jobs" of the industry.

In these 50 years, Mathews' Engineers have developed the most complete line of gravity and power conveyers and special conveying machinery to be found anywhere—to serve nearly every class of industry in the United States and Canada.

Whatever is required—standardized conveyor units or a complete system—you'll find that Mathews has it. Three modern plants. Engineering sales offices and standardized conveyor distributors located in most principal cities.



MATHEWS CONVEYER COMPANY WEST COAST SAN CARLOS, CALIFORNIA

LOS ANGELES • PORTLAND • SEATTLE • DENVER • FORT WORTH
DALLAS • HOUSTON • EL PASO • HONOLULU, T. H. • SALT LAKE CITY

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

MATHEWS

... for more details, circle No. 103 on Reader Service Postcard

CIRCUIT CONTROLLING COUNTERS with Automatic Reset

FOR REVOLUTION, STROKE AND ELECTRIC COUNTING

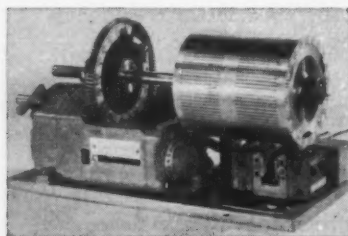
THESE predetermining counters with instantaneous reset will automatically recycle a variety of single and multi-stage switch functions. Recycling operates without time lag at speeds to 5,000 rpm. The switching pattern repeats automatically as long as desired. The control circuit is an integral part of the equipment.

CYCLO-MONITORS

Used to control one or two switching events within a preset count-cycle.



Replace unwieldy change gears, cam systems, timing chains, etc.—provide quick and completely flexible adjustment for changing requirements. Adjustment in one-count increments extends over a wide range of numbers. Available in a variety of models—write for General Catalog of Cyclo-Monitors.



PROGRAM MONITORS

Same cycle range as Cyclo-Monitors, but also permit ANY NUMBER of intermediate switching events. Complex switching patterns of any countable sequence can be programmed and automatically repeated. Momentary or dwell switching—continuous or intermittent operation. Built-in control circuit can be opened or closed at any numbers. Write for Bulletin 505.

COUNTER AND CONTROL CORPORATION

5212 W. Electric Ave.
MILWAUKEE 19, WIS.

...for more details, circle No. 104
See Directory listing page 89

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Alloy Rods Co.



Richard James

Allis-Chalmers Mfg. Co.

... has assigned E. R. Perry to the Southwest region and Charles R. Isaacs to the Los Angeles district of its industries group. Perry, who has been an application engineer at the Boston Works since 1952, has been named switchgear specialist in the Southwest with headquarters in Dallas. Isaacs, a sales representative, is being transferred from the Kansas City district office.

Houghton Laboratories, Inc.

... has made Lloyd A. Dixon, Jr., West Coast sales manager. Since 1953 Dixon has been a sales engineer and West Coast manager of Kirby Fiberglass Co., also serving as technical consultant on problems of Fiberglass reinforcement in the plastics industry. He will have his headquarters at Houghton's West Coast office in Culver City, Calif.

Clevite Harris Products, Inc.

... has appointed Henry M. McCarthy as manager of its newly-created West Coast sales district. The Cleveland based firm, manufacturer of rubber and rubber-and-metal parts for the automotive industry, is expanding its operations to include the aircraft, home appliance, marine, and material handling industries.

National-U.S. Radiator Corp.

... has named William G. Huston Western regional sales manager for its Unarco air conditioning products. Huston held the same position with the air conditioning division of Union Asbestos & Rubber Co. before joining the Johnstown, Pa., firm. Huston will make his headquarters in San Francisco.

TelAutograph Corp.



J. O. McReynolds

... has added John O. McReynolds to its staff as manufacturing manager. According to the telecommunications system manufacturer, expanding executive requirements called for someone to head the firm's production program. McReynolds has had 20 years of experience in instrumentation, design research, and development, 10 of that with an electronics manufacturer. He was formerly employed by Chrysler Corp. and Thompson Products.

Yours for the asking...

ANSWERS TO CONVEYOR PROBLEMS

NEW, 4-page catalog tells and shows how Yuba-Schrock internal drive head pulleys save space, cut downtime, promote safety; liberally illustrated with photos of Western applications. Diagrams and charts give dimensions and speeds for sizes from 1 to 125 hp.

See for yourself how "the head pulley with the motor inside" solves conveyor problems. Write for your FREE copy of this Yuba-Schrock folder now.



YUBA MANUFACTURING CO.

701 East H Street • Benicia, California

... for new catalog, circle No. 105 on Reader Service Postcard
See Directory listing page 104
WESTERN INDUSTRY — September 1956

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THE INDUSTRIAL WEST ON ITS WAY

plants • production • distribution • personnel

GUIDELINES

- **ALUMINUM SUPPLY SHOULD LOOSEN UP DURING NEXT FEW YEARS.** It's been tight and prices have gone up recently, even with one new 60,000-ton annual capacity plant added in Montana and new potlines added at several existing producer plants.

Tight supply conditions have been caused chiefly by drops in foreign aluminum production. U. S. import dropped to 197,000 tons in 1955 as compared to 216,000 tons in 1954. An increase in civilian use of aluminum also enters the tight-supply picture, while military-use consumption has dropped from 30% during 1952 peak of Korean conflict to a current 10% of annual output.

Price hasn't skyrocketed: actual increase since March 1955 has only been 2.7 cents with current price at 25.9 cents.

One situation-easer is a 1956 first-quarter production increase of 11% over that period of 1955. Another 9% increase is expected during the remainder of this year. National capacity is forecasted to go up by 45% by the end of 1958.

Here's how Western aluminum fabricators stack up on the receiving end. California is the home of 1,608 fabricators of aluminum products (about 7% of the national figure as compared to 3% in 1950 and an expected 10% in 1960). Only 10% of current fabrication is devoted to military products. Primary producers of aluminum in the Pacific Northwest fabricate products of 45% of their own output. No figures are currently available on other manufacturers of aluminum products in that area, but a rough idea of aluminum activity in the Northwest can be gained from the **\$654,000,000 spent** on original investment and expansion during the 1953-55 period.

- **NATURAL GAS HOOK-UP TO PORTLAND** was completed recently when the last link in a line from the San Juan Basin in New Mexico was bolted into place. All areas of the Northwest should be receiving natural gas by November when the \$230,000,000 pipeline project is completed.
- **WESTERN INDUSTRY WILL SHARE GREATER INDUSTRIAL GROWTH THAN NATIONAL AVERAGE** as far as the forecasted 10-year 100% increase in demand for lift trucks is concerned. This, and a belief that Yale & Towne lift truck sales in the West will zoom to 150% of current demand, is factor on which that company banks its plans for expansion of sales and service facilities. First move is a new factory sales and service branch in Los Angeles. Assembly plant is reportedly scheduled for Northern California.
- **HEAVY TRUCK SALES ARE ON THE UPSWING TOO:** White Motor opens new parts warehouse in Los Angeles prompted by a **30% increase in Pacific Coast sales** during first half of 1956.
- **BEEN WONDERING ABOUT AEROJET-GENERAL'S LITTLE BRANCH IN WALNUT CREEK?** Shutters are open now and the unit has been formed as Aerojet-General Nucleonics—designers and builders of a new-concept research nuclear reactor. First unit will be completed at new headquarters in nearby San Ramon, Calif., in October.
- **TYPICAL OF ONE ROUTE TO THE WESTERN INDUSTRIAL SCENE** is Clark Controller's "substantial sales growth in the Los Angeles area since first entering the region's market five years ago." Program is now underway which will "grow into a full West Coast division with significant local manufacturing operations"—**10,000-sq. ft. plant underway in L.A. is their starter.**

News details on following pages



FIRST STEP in Western expansion program for Yale & Towne Manufacturing Co. is construction of a new factory sales and service branch in Los Angeles.

Yale & Towne on the move in the West



P. R. Minich

In order to meet what is estimated will be a 150% increase in industrial lift truck sales in California and the West during the next 10 years, Yale & Towne Manufacturing Co. has launched an expansion of its sales and service facilities. First move is the construction of a factory sales and service branch in Los Angeles.

The Los Angeles branch will be built in an industrial park area in

East Los Angeles. It will have complete stocks of service parts controlled electronically through IBM equipment maintained in the company plant in Philadelphia, factory trained service personnel, large truck inventories, and radio-controlled mobile service units.

According to Paul R. Minich, Jr., general sales manager, territory to be covered by the new branch includes all of Southern California and a portion of Southern Nevada. He said the firm plans to establish a representative in San Diego, sub-branches in Fresno and Sacramento, Calif., appoint representatives for Phoenix, Albuquerque, Portland, Yakima, and strengthen its representation in Seattle, Spokane, and Salt Lake City.

New Los Angeles plant for Clark Controller



K. D. Christopher

Clark Controller Co. of Cleveland, Ohio, has established engineering and manufacturing facilities to take care of its growing volume in the Los Angeles area. The electrical control equipment firm has occupied a 10,000-sq. ft. building in the Vernon central manufacturing district for its newly-established Los Angeles division, which will include the former district sales office and the engineering and manufacturing departments.

Sales offices and local stocks have been moved to the new building. Manufacturing operations, which now consist primarily of engineering and assembly of special control panels and motor control centers, have also begun.

King D. Christopher, who has been manager of the Los Angeles district sales office, will be general manager of the new division. He has been with Clark for 20 years. T. J. Hegedus, assistant chief draftsman, will join the new division as manufacturing engineer.

The Los Angeles plant will be the first control manufacturing operation conducted outside of Cleveland by Clark Controller.

Electronics plant for Sperry Rand near Phoenix

Sperry Rand Corp. of New York has acquired a 480-acre plant site about 15 mi. north of Phoenix, Ariz., for an aviation electronics plant. According to Herbert C. Bostwick, aviation division manager, work should begin this month on the initial plant unit, between 75,000 and 100,000 sq. ft. in area.

The initial plant will represent an investment of more than \$2,500,000 in facilities and will be used for development and production of electronic flight and engine control systems for advanced aircraft.

The firm also plans construction later of a companion flight research unit at Phoenix Sky Harbor Airport.

Monsanto to erect phosphoric acid unit

Monsanto Chemical Co. has started work on a phosphoric acid unit at Colorado Fuel & Iron Corp.'s plant in Pueblo, Colo. The unit, the first of its particular type and size, has been engineered to meet the needs of Colorado Fuel's coal-chemical operations.

Elemental phosphorus will be shipped from Monsanto's plant in Soda Springs, Idaho, to Pueblo to burn in the unit to produce phosphoric acid. Acid will then be piped to Colorado Fuel's plant system to use in producing di-ammonium phosphate, a fertilizer.

Industrial ceramics firm born in California

Thermo Materials, Inc., has been organized in the San Francisco Bay Area to develop and produce precision high temperature industrial ceramics. The firm is under the joint ownership of Gladding, McBean & Co. of San Francisco and Los Angeles, Provident Securities Co. of San Francisco, and a New Jersey firm.

The firm's plant will occupy a 2½-acre site near Menlo Park, south of San Francisco, and is expected to be in production by December 1956. Executive offices are located in San Francisco.

Thermo will manufacture and dis-

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tribute ceramic and cermet items for the electronics and fabricated metal industries, as well as ferrite components capable of withstanding high temperature environments for the mechanical, electrical, chemical, and nuclear industries.

President of the firm is *Emmett G. Solomon*, vice president of Provident. Executive vice president and general manager is *Emo D. Porro*, formerly of Kaiser Industries and Stanford Research Institute.

Cutler-Hammer completes sales, manufacturing plant



R. C. Seibert

Cutler-Hammer, Inc., Milwaukee, Wis. electrical manufacturer, has completed its new 31,500-sq. ft. manufacturing and sales facility in Los Angeles and appointed a new district sales manager for the area.

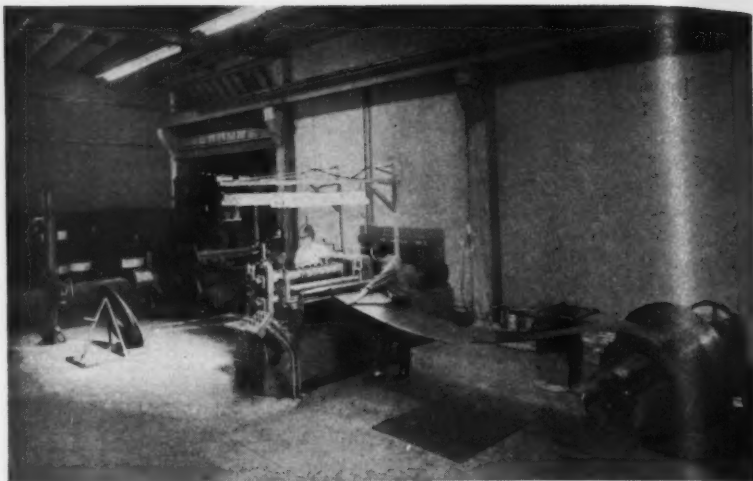
The plant is located on a 3-acre tract in the central manufacturing district of the city. About 27,000 sq. ft. of floor space is devoted to manufacturing and warehousing operations, while the remaining space is occupied by air-conditioned sales offices.

R. C. Seibert has been appointed Los Angeles district sales manager. He replaces *W. G. Tapping*, who has retired after 25 years of service with the firm.

Lightcraft to meet lamp demand by building plant

Expanding demand for residential lighting fixtures and lamps is the reason advanced by Lightcraft of California for its plans to build a \$1,000,000 manufacturing plant in Los Angeles. It will be located on a 2½-acre site and have 55,000 sq. ft. of space. It is also designed for expansion over another 15,000 sq. ft.

About two thirds of the space will be given over to manufacturing, the rest to warehousing. There will be 5,000 sq. ft. of air conditioned offices and additional indoor showroom space.



ADDITIONAL EQUIPMENT for expanding activities of State Tube Corp. created need for a new plant adjacent to State Industries' headquarters in Los Angeles.

State Industries completes manufacturing structure

A 8,000-sq. ft. steel and concrete structure has been completed by State Industries, Inc., adjacent to its quarters in Los Angeles, bringing the firm's space to 34,000 sq. ft. The addition will accommodate more manufacturing equipment for State Tube Corp., a part of State Industries.

State Tube supplies steel tubing to State Awning Co. and State Canvas & Frame Supply, both State Industries' firms also.

Griffin Wheel breaks ground for \$1,000,000 wheel plant

Ground has been broken for a \$1,000,000 plant to provide steel wheels for West Coast railroads, according to Griffin Wheel Co. Located in Colton, Calif., the plant will employ about 100 initially.

A. P. Nilles, who will be manager of the plant, anticipates that it will be in operation by April 1957.

Minnesota Mining purchases control of Zenith Plastics

Control of Zenith Plastics Co., Los Angeles manufacturer of aircraft components, has been purchased by Minnesota Mining & Manufacturing Co. Price was \$4,000,000 in cash

and common stock for almost all of Zenith's assets.

Minnesota Mining will operate Zenith as a wholly-owned subsidiary, and the change in ownership will not affect the operations of the plastics firm. Zenith produces Radomes, reinforced plastic radar housings used on military planes; and also antenna housings, stabilizer and wing tips, and aircraft window frames.

Specialty Steel Sales formed in Hollywood

Specialty Steel Sales, Inc., has been formed in North Hollywood, Calif., by *Harry S. Weiss*, who will be its general manager. The new firm will represent several eastern companies in the metals field.

General Electric reorganizes Hanford atomic operations

General Electric Co. has reorganized its Hanford Atomic Products Operation at Richland, Wash., changing from a centralized organization to a decentralized set-up.

Under the new arrangements the atomic plant has three product departments plus three supporting organizations and counsel. Each component is being operated as much like an independent business as over-all Hanford interests permit.

Each component has its own man-

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WESTERN INDUSTRY — September 1956

THEY'RE BUILDING THE WEST ...WITH KAISER STEEL

PACIFIC IRON & STEEL CORP., Los Angeles, has become one of the West's largest producers of long-span roof decking made of steel sheet. The company specializes in standard steel buildings and is a fabricator and erector of structural steel for industrial and commercial construction.



MOORE DRY DOCK, Oakland, operates one of the largest shipyards on the West Coast. The ferry, *Crown City*, shown below is an example of Moore craftsmanship. Moore Dry Dock is also a leader in general steel fabrication work, using large quantities of Kaiser Steel plate and structurals.



THESE COMPANIES are playing an important role in the vigorous growth of the West. They are among the hundreds of manufacturers, fabricators, and distributors who rely on Kaiser Steel's close-at-hand supply of diversified steel products. To serve these growing western industries, Kaiser Steel is going forward with the largest expansion in its history to place in operation more new steel capacity than was built into the original Fontana plant during the entire war period, 1942-1945.

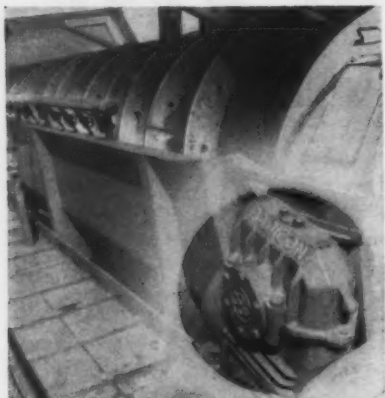


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built to serve the growing West

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For example, this triple pitch, 60 in. classifier de-waters sand and filters rock to the tune of 150 tons per hour—continuously for the entire day. The Radicon specified to do the job is model 8 RHU (ratio 40:1). Using a 10 hp motor at 1,900 rpm, the Radicon output shaft delivers 47 rpm into the final reduction—at 85% efficiency.

The above installation is completely in the open—an example of the fan-cooled Radicon's ability to withstand extremes of temperature as well as dust and rain. Immediate delivery of the 8 RHU Radicon. Packaged Drives supplied by authorized David Brown factory branches and distributors.

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San Francisco-Oakland: George M. Philpott Co., Inc.
Seattle, Washington: Cascade Machinery Co.

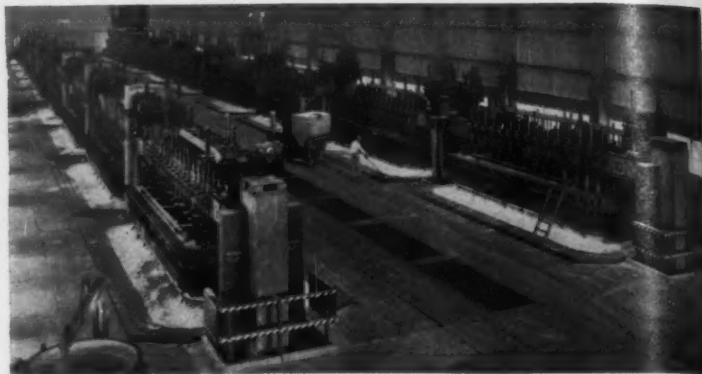


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Kaiser Aluminum increases capacity by 10,000,000 lb.



NEARLY TWICE THE SIZE of conventional pots presently in operation at Kaiser Aluminum & Chemical's Tacoma, Wash., plant, 18 new reduction cells recently added put the plant's annual capacity at 77,000,000 lb. Expansion program, which included a building to house the cells, an office and laboratory building, and an electric substation, cost \$2,250,000.

ager and each product department has its own finance, employee relations, engineering, research, union relations, and employment functions. New components include fuels preparation department, irradiation processing department, chemical processing, relations and utilities operation, Hanford laboratories operation, and construction engineering operation.

\$3,500,000 expansion for Riverside Cement

Riverside Cement Co. is increasing its finish cement producing facilities at Oro Grande, near Victorville, Calif., by about 50%, as well as adding a new cement pack house and two bulk loading stations there. The project, which got underway last month, will cost about \$3,500,000.

Fluor Corp., Ltd., which was awarded the contract for the design, engineering, and construction, has scheduled completion of the facilities for July 1957.

Neely to represent Magnetic Corp. in West

Neely Enterprises will serve as field engineering and sales representatives in California, Arizona, New Mexico, and Nevada for Magnetic Research Corp. of El Segundo, Calif. The appointment provides Magnetic with the services of 28 Neely field engineers out of eight branch offices.

Neely will handle Magnetic's all-magnetic components for automation, computer, communication, electronics, instrumentation, aviation, and guided missile applications and dual magnetically regulated d-c. power supplies.

B. F. Goodrich opens new L. A. distribution center

B. F. Goodrich Co. has opened its new Los Angeles distribution center to house industrial sales offices and warehouse facilities for its tire, industrial products, and shoe products operations. The center covers 131,000 sq. ft. with 6,150 of that devoted to offices.

The firm has 48,000 sq. ft. of paved area for truck service, customer, and employee parking, and shipping docks to accommodate 12 trucks and seven railroad cars at one time. According to L. T. Greiner, Pacific zone manager, the move should speed customer service through better warehousing facilities.

Fabricated Steel forms wood products division

A wood products division has been established by Fabricated Steel Service, Inc., a North Hollywood, Calif., firm. The division will manufacture products made from either metal or wood, or a combination of both.

Manager of the division will be Warren J. Spivey, who has had 20 years of experience in the design and engineering of wood products.

Stanford Research forms department of metallurgy

Stanford Research Institute in Menlo Park, Calif., has formed a department of metallurgy to be under the chairmanship of Rudolph H. Thielemann, an authority on high temperature alloys, refractory metals, titanium, and nuclear reactor metallurgy. Metallurgy was formerly a section of

...for more details, circle No. 109
See Directory listing page 87

SRI's chemistry department and has been separated because of the growth of its program and staff.

Group heads for the new department are *Drs. Emery Chilton*, electrochemistry; *Thomas Tietz*, physical metallurgy; *Arthur G. Wilder*, process metallurgy; and *William R. Holman*, liquid metallurgy.

Stocker Manufacturing opens Western office, warehouse



Jim Murray

Stocker Manufacturing Co., New Jersey manufacturer of reinforced waterproof papers for the industrial and construction fields, has opened a sales office and warehouse in San Francisco. Joining Stocker as West Coast representative is *Jim Murray*, formerly of American Sisakraft. Murray will headquarter in the new office and handle sales in seven Western states.

Andrey to distribute for FlexAngle Corp.

Andrey Co. of Los Angeles, Calif., has been appointed a distributor for FlexAngle Corp. of West Hartford, Conn. FlexAngle makes universal slotted angle components for infactory erection of metal bar, gear, drum and other racks and platforms.

Allegheny buys Repath stamping, assembly firm

Allegheny Ludlum Steel Corp., Pittsburgh, Pa., has purchased Paul R. Repath, Inc., Los Angeles producer of electrical steel laminations, metal stampings, and deep drawn transformer cans. Arnold Engineering Co., a subsidiary of Allegheny Ludlum, will operate the plant as the Repath Pacific Division.

Paul Repath, founder of the company, will continue to direct its activities and no changes in personnel are anticipated.

Crown Zellerbach building \$1,000,000 corrugating plant

Crown Zellerbach Co. has started work on a \$1,070,151 corrugating unit on its property near Antioch, Calif. The plant is part of a \$20,000,000 plant the company is going to construct on the site. Several other units are also under way.



- 1 Proven, Westinghouse-manufactured, extended surface heating coils good for continuous operation up to 200 psig.
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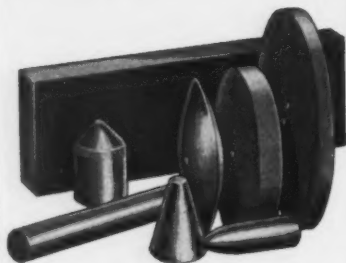
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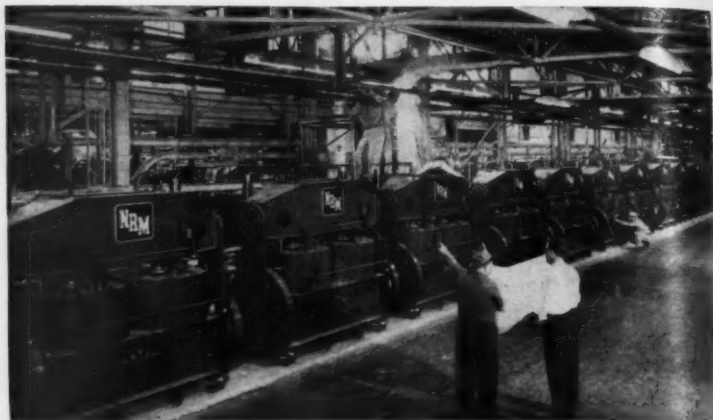
CITY

ZONE STATE

150

...for more details, circle No. 111

B. F. Goodrich boosts tire production 50% in LA



ONLY PART OF THE EXPANSION, which will total out at a \$6,000,000 cost, is the installation of these new passenger car tire presses at B. F. Goodrich Tire's plant in Los Angeles. New presses are designed to produce tubeless tires, as well as conventional tires suitable for both 14 and 15-in. wheels.

**Dawn to build, operate
uranium processing mill**

Dawn Mining Co., New York, has signed a contract with the U.S. Atomic Energy Commission for the construction and operation by Dawn of a \$3,000,000 uranium processing mill about 40 mi. northwest of Spokane,

Wash. Construction work will begin immediately with completion scheduled in about 12 months.

The mill will process ores from the Northwest region, including ore controlled by the contractor as well as ore bought from independent producers. The uranium concentrate will be sold to the AEC under the terms of the contract.

**Aerojet-General forms
nuclear subsidiary**

Aerojet-General Corp., Azusa, Calif., a subsidiary of General Tire Co., has formed Aerojet-General Nuclearics devoted to nuclear reactor construction. Dan A. Kimball, president of Aerojet, will also be president of the new corporate subsidiary, AGN, which is located at Walnut Creek, Calif.

Arthur T. Diehl will head the subsidiary as technical director, while Robert Mainhardt has been appointed general manager.

**Los Angeles facility planned
by National Electric Corp.**

National Electric Products Corp. has announced that it will construct a warehouse for electrical distribution systems, fittings, and accessories in the Vail Field central manufacturing district of Los Angeles. It should be completed by November.

National Electric will discontinue its operations at Torrance, Calif., but will maintain stocks there until the new warehouse is completed. The Los Angeles warehouse will carry systems and supplies to serve all its West Coast distributors.

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...for more details, circle No. 112

New parts warehouse for White Motor; sales up 30%

White Motor Co. has opened a Pacific Coast parts warehouse, located in Los Angeles at its factory branch. According to Wilson D. Patterson, vice president of the Pacific Coast region, the warehouse was opened as a result of a 30% increase in truck sales for the first half of 1956, as compared to the same period in 1955.

The new warehouse will be headed by William Kosteletzky, former manager and inventory control clerk of the parts department in Los Angeles. Assistant parts service manager will be Emil Kaminski.

Edna Bay Stone announces plans for \$5,000,000 plant

Edna Bay Pure Stone Co. of Dallas, Tex., has announced plans to build a \$5,000,000 limestone processing plant in Vancouver, Wash. The plant will process limestone quarried at Edna Bay, Alaska, where the firm has leased limestone claims from the Aluminum Co. of America.

Construction is scheduled to start early in 1957, although a specific building site has not been chosen. However, the plant will be located on the Columbia River.

Ukiah Wire to distribute for Fort Worth Steel

Ukiah Wire Rope & Rigging Co. of Ukiah, Calif., has been appointed a distributor of the mechanical power transmission equipment manufactured by Fort Worth Steel & Machinery Co. of Fort Worth, Tex. The line includes sheaves, sprockets, hubs, and other components for V-belt and roller chain drives.

Bristol Co. opens new Western sales office

Denver, Colo., is the site of the new Western sales office opened by the Bristol Co. of Waterbury, Conn. R. G. Tower, former manager of the firm's Chicago office, has come West to be manager of the new district office.

Karl-Douglas launches \$1,000,000 Calif. plant

Construction has begun on the \$1,000,000 plant for the Karl-Douglas division of Thompson Products, Inc. The plant, located in an industrial area of Long Beach, Calif., is on a 20-acre landscaped site.

Scheduled to manufacture hydraulic assemblies, valves, actuators, and manifolds for aircraft, the plant will

employ about 200 people. It will be of tilt-up construction with reinforced pre-cast concrete wall panels, will have steel girders and joists, and gypsum roof decking. Engineering offices will have 15,000 of the total 60,000 sq. ft. of space.

\$10,000,000 chemical plant planned for Puget area

The Puget Sound area is scheduled to get a \$10,000,000 petrochemical plant, according to New England Industries, Inc. A site has not been se-

lected yet, but the firm will need up to 100 acres for the plant and additional acreage for storage.

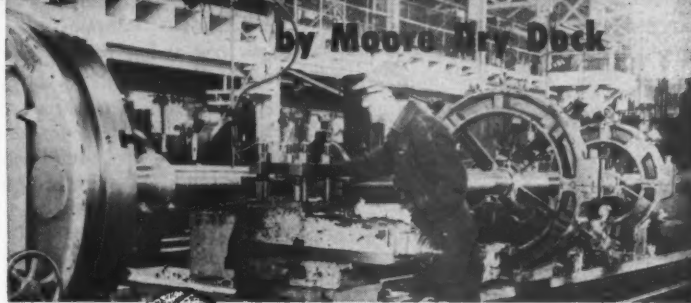
Some site study has been conducted and more will be made. Any site chosen is subject to approval from the Department of Defense.

Kaar Engineering to market through equipment outlets

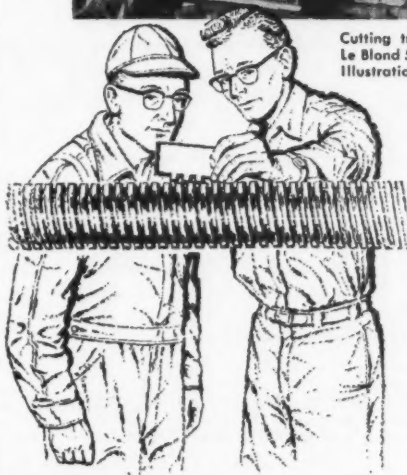
Kaar Engineering Corp., Palo Alto, Calif., makers of radiotelephones, has announced that it will now market its equipment through industrial equip-

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Cutting triple lead screw thread for steel mill shaft on Le Blond 50" swing x 39' between centers heavy duty lathe. Illustration: Checking Acme thread pitch with thread gauge



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*Selling the West
is an 11-state job*



Covers it all!

...for more details, circle No. 114

ment outlets instead of through the usual factory-to-user channels, Kaar will appoint industrial sales firms to cover limited territories with the two-way industrial radio equipment.

Kaar has already appointed King-Moon Co., Inc., as Arizona representative to handle its complete line of mobile radiotelephones and direction finding equipment.

West Coast gets first metal perforating plant

Diamond Manufacturing Co., a Pennsylvania producer of perforated metal products, has established an affiliate, Diamond Perforated Metals Co., in Gardena, Calif. The new firm, the first on the West Coast, will be under the same management as its parent company.

CalChassis completes new plant facilities

California Chassis Co. of Lynwood, Calif., has added 6,000 sq. ft. to its floor space with the completion of a third factory structure adjacent to its present facilities. The additional space allows the firm to change its production format so that there are separate divisions for catalog products and custom orders.

The new structure will be devoted entirely to custom production with W. S. McNeal, Jr., vice president and chief engineer, directing activities.

Lumber mill to go up in Sonoma County area

Plans have been launched for construction of a lumber mill in Sonoma County, Calif. Called the C & S Lumber Co. of Willits, it will be constructed on a 36-acre site between Forestville and Graton.

Prime-Mover Co. appoints California distributors

Prime-Mover Co. in Muscatine, Ia., has appointed two California distributors. Essick Machinery Co. in Los Angeles will serve the Southern California area, while Ricker Machinery Co., headquartered in Oakland, will cover Northern California. Prime-Mover makes powered carts for hauling bulk materials.

Pendleton Woolen buys Foundation Worsted plant

Pendleton Woolen Mills has acquired the former Foundation Worsted Mills plant from Oregon

Worsted Co. and will use it to spin and weave Pendleton fabrics. New machinery for the plant has been ordered and the plant should be in operation before the end of 1956.

The building acquired has 85,000 sq. ft. of floor space, which will accommodate 48 additional looms with carding, spinning, and finishing equipment. Frank Learned will be in charge of operations at the new plant.

Triad Transformer opens third plant building

Triad Transformer Corp. of Venice, Calif., has opened its third plant building with a ribbon cutting ceremony conducted recently. The new plant, covering 16,000 sq. ft., brings Triad's total production and storage area to 70,000 sq. ft.

Designated Plant 3, the new building houses jobber sales and inventory, machine shop, and shipping department.

Western Phosphates schedules \$2,000,000 Garfield expansion

Western Phosphates, Inc., of Salt Lake City, Utah, plans to spend \$2,000,000 for the expansion of its plant near Garfield, west of Salt Lake City. Program calls for increased plant production and the addition of other agricultural fertilizers to be produced.

Kaiser Steel addition to use 10,000-hp. motor

A 10,000-hp. electric motor which is 44½ ft. long will be used for the slabbing mill addition to Kaiser Steel Corp.'s Fontana, Calif., production facilities. The motor and other mill equipment, totaling \$3,000,000 in value, will be provided by Westinghouse Electric Corp.

The 10,000-hp. motor is actually two motors operated as a twin drive. It stands 14 ft. high and is 16 ft. wide, and operates at 40 to 80 rpm. Other equipment includes a 4,000-hp. motor for the edger roll.

Calaveras Cement opens bulk transfer plant

Calaveras Cement Co. has opened a bulk cement transfer plant in San Leandro, Calif., to supply the San Francisco and East Bay construction industry. The \$100,000 installation has a storage capacity of 5,000 bbl. of cement and is replenished daily by rail.

In addition to supplying the San Francisco area, the plant will also serve the North Bay and peninsula points within a radius of 25 mi. The plant started on its present site in March with 800-bbl. capacity.

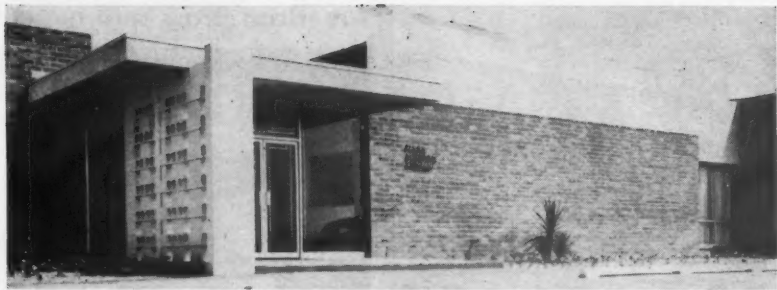
Old & Son joins Rolph, Mills & Co.

James A. Old & Son, San Carlos, Calif., sales agents, have joined Rolph, Mills & Co., also sales agents, in San Francisco, and will operate as the Old & Son materials handling division of Rolph. Lines handled by Old include ladders, batteries, pallet racks, and other materials handling equipment.

Armco Drainage constructs \$1,000,000 fabricating plant

A \$1,000,000 fabricating plant is under construction in Denver for Armco Drainage & Metal Products, Inc. The firm's present plant in the city will be sold when the new one is completed in about six months.

Denver is the headquarters for the Rocky Mountain division of the steel fabricating firm, which employs about 300 in the area.



NEW FURNACE PLANT and regional headquarters for Pacific Scientific covers 31,000 sq. ft. of a 4-acre site in Gage industrial tract, Los Angeles. Plant cost \$500,000.

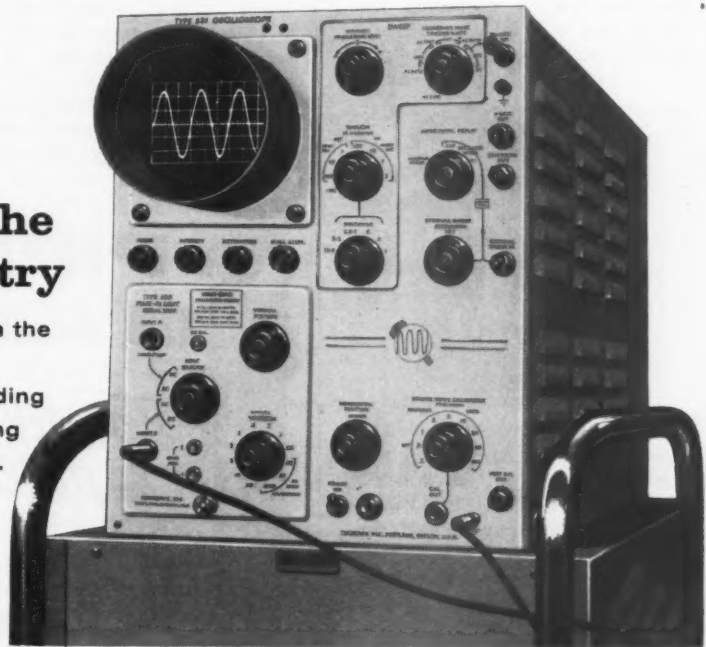
Pacific Scientific finishes regional headquarters

Work has been completed on a new \$500,000 furnace plant and regional headquarters offices for the Pacific Scientific Co. in Los Angeles. Located in the Gage industrial tract, the units occupy 31,000 sq. ft. on a 4-acre site.

The three-bay steel furnace plant is now in operation. Other production equipment has been installed and the plant is using three push button cranes to facilitate in-plant handling. Engineering offices adjoin the plant while a separate building houses test shops, instrument laboratories, and service units.

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...for more details, circle No. 116

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American Brass mill nears completion in So. Calif.



ADDITIONAL CONTRACTS have been awarded Rosendahl Corp. for completion of mill construction and installation of all machinery and mechanical work needed for American Brass Co.'s new \$18,000,000 plant in Paramount, Calif.

General Electric buys Fresno electrical firm

General Electric Co. has purchased substantially all the assets of the Valley Electrical Supply Co. of Fresno, Calif., a firm wholesaling GE appliances, air heating and cooling equipment in the southern San Joaquin Valley and the adjacent coastal areas. GE will assume operation of the firm.

Orr & Sembower adds Western sales reps

Orr & Sembower, Inc., Reading, Pa., manufacturer of packaged automatic boilers, has added three sales representatives in the West.

Handling sales in Arizona and New Mexico will be General Equipment Sales, Inc., located in El Paso. Serving Utah and parts of Wyoming and Nevada will be Thermal Engineering Co. of Salt Lake City, while Richardson Equipment Co. of Boise will serve Southern Idaho. All three will offer application engineering and complete services.

Ryder-Elliott moves to 45,000-sq. ft. plant

Ryder-Elliott, Inc., Los Angeles tubular products firm, has moved to a new 45,000-sq. ft. plant on a 2½-acre site, acquiring more room for expansion. The building includes ample space for machinery and assembly lines and has storerooms, shipping docks, and air conditioned offices and showrooms. Space and equipment for the custom department are also included.

Ryder-Elliott supplies material to the aviation industry for manufacturing ejection seats and ground handling equipment.

Allmetal Western division moves to new headquarters

The West Coast division of Allmetal Screw Products Co., Inc., Garden City, N.Y., manufacturer of stainless steel fasteners, has moved to new headquarters on Wilshire Blvd. in Los Angeles. Allmetal West Coast, created in January 1956, has already outgrown its original facilities.

PIPE

1/8" thru 30"

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 ATLANTA 8 • HOUSTON 2 • LOS ANGELES 5

...for more details, circle No. 117

Pritchard appoints Darling new sales representative

J. F. Pritchard & Co. of California has appointed R. A. Darling Co., Wheat Ridge, Colo., as sales representative for Colorado and Wyoming. Darling will represent Pritchard's line of cooling towers for air conditioning and industrial applications, and its packaged units for dehydration of air and other gases.

Automation Electronics formed in Southern California

Automation Electronics, Inc., has been formed in Burbank, Calif., to manufacture electronics equipment, and has been awarded an Air Force contract for modification kits. Heading the organization is *Frank G. Jamison*.

Executive vice president is *Thomas L. McKnight*, while *Howard Skouby* is treasurer. Other members of the board of directors include *James Kindel* and *Richard Neville*. *Robert W. Cripe* is general manager.

Allis-Chalmers appoints new California dealers

Allis-Chalmers Manufacturing Co. of Milwaukee, Wis., has appointed three new California dealers for its Buda Division's materials handling equipment. Included are Utility Trailer Sales Co. in San Diego, Utility Trailer Sales of Fresno, Inc., and Aikins Tractor Co. in Eureka.

U.S. Chemical completes new plant in 2 months

Sixty days after the first shovelful of earth was turned for United States Chemical Milling Corp.'s structure in Manhattan Beach, Calif., the plant was in operation. The 36,000-sq. ft. plant and chemical milling tanks are now in use for milling aluminum and magnesium parts.

The plant, located on 7½ acres of land, cost the firm about \$500,000. U. S. Chemical is at present specializing in processing airframe parts.

Miller & Stern leases additional floor space

Miller & Sterns Supply Co., San Francisco distributor of industrial supplies and lubricants, has leased a building adjoining its present facilities, providing an additional 50 ft. of frontage and doubling its present floor space. The additional space will make it possible for the firm to add more products to its present line.

Albert Air Conveyor formed in Oakland

Douglas Albert has formed the Albert Air Conveyor Corp. in Oakland, Calif., to manufacture equipment for the pneumatic conveyance of granular bulk materials with air. Albert, formerly with Vacu-Blast Co. in Belmont, Calif., will serve as president of the firm, which has located its offices at 600 Sixteenth St.

Main uses for the firm's products will be in the food and chemical industries to move such food materials as flour, sugar and starch, and chemicals such as soda ash, lime, and catalyst.

Pomona Tile purchases property adjoining plant

Pomona Tile Manufacturing Co. has purchased 6 acres of land adjoining its main plant at Pomona, Calif., for the purpose of future expansion. The property, purchased for \$100,000, includes a building and 1,200 ft. of trackage serviced by the Southern Pacific and Union Pacific railroads.

Although the firm has no immediate plans for construction on the property, it was purchased as a part of its \$800,000 expansion and modernization program for the Pomona plant and for its eastern plant. In line with the modernization program, Pomona Tile has also set up a quality control laboratory at the Pomona plant.

Triplett Electrical to build West Coast plant in Oceanside

The Oceanside Industrial Center at Oceanside, Calif., has been selected as the site for a new West Coast plant to be erected by Triplett Electrical Instrument Co. of Bluffton, Ohio. The Oceanside plant will manufacture and assemble precision electronic testing meters for industrial use.

The new plant will occupy 2 acres, with construction of the first unit of 10,000 sq. ft. scheduled for completion this summer.

Burroughs Corp. acquires ElectroData Corp.

Burroughs Corp. of Detroit, Mich., has acquired ElectroData Corp. of Pasadena, Calif., and will operate it as the ElectroData Division of Burroughs. *James R. Bradburn*, president of ElectroData, will be a vice president of Burroughs and general manager of the division.

The division will manufacture and distribute the Datatron, a high speed, general purpose digital computing system developed by ElectroData and Burroughs' products.

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St. Louis 8, Mo.

...for more details, circle No. 119

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Collet Tank, Orange Co. merge with PIE Co.

Orange Transportation Co. and Collett Tank Lines of Salt Lake City have merged with Pacific Intermountain Express Co., giving PIE direct route service between the Middle West, Intermountain, and Pacific Northwest areas.

Owen Collett, president of both firms, joins PIE as a vice president. His firms add to PIE communities in Idaho, Utah, Montana, Oregon, Wyoming, Colorado, New Mexico, and Nevada.

New Oregon corporation plans Beaverton box plant

Western Corrugated, Inc., a new Oregon corporation, plans to build a corrugated box plant on the east edge of Beaverton to make shipping containers for fruit growers, canners, and Northwest industrial users.

The plant will be located on 10 acres of a 300-acre Southern Pacific industrial tract and will consist of a 50,000-sq. ft. building. It is designed for a maximum production of 360,000,000 sq. ft. of corrugated boxes annually and should cost about \$300,000 to build.

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...for more details, circle No. 120

Pennsalt Chemicals makes Contract Engineering agent

Contract Engineering Co. of Denver, Colo., has been appointed agent for Pennsylvania Salt Manufacturing Co., Philadelphia. The firm will represent Pennsalt's coatings, mortars, and interliners, as well as offer services in design and specification of chemical resistance construction and coatings.

Territory covered includes Arizona, New Mexico, Colorado, and Wyoming.



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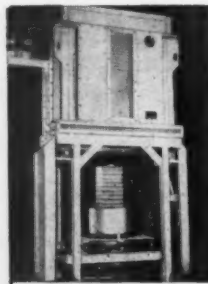
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F-22

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WESTERN INDUSTRY — September 1956

Norris-Thermador announces \$2,000,000 expansion plan

Norris-Thermador Corp. of Los Angeles has announced that it is undertaking a one-year expansion and improvement program which will amount to about \$2,000,000. The program will enlarge and improve the firm's facilities for the production of wheels.

The firm will also start producing a 14-in. wheel to furnish West Coast assembly plants for their 1957 models.

Salt Lake Refining Co. to construct reformer

Salt Lake Refining Co., a subsidiary of Standard Oil Co. of California, has announced plans for the construction of a 6,000 bbl./d. platinum reformer, which will enable it to step up output of higher octane gasolines for high compression auto engines.

Tentative date for completion of the construction is September 1957. Current capacity of the plant is 40,000 bbl./d. of crude oil.

Vitro Corp. plans to spend \$1,200,000 for expansion

Vitro Corp. of America has announced that it plans to spend about \$1,200,000 for an expansion of its Salt Lake City uranium mill. The program will get under way as soon as contracts are signed with the Atomic Energy Commission. The agreement would extend the expiration date of the present contract with AEC from 1958 to 1962.

Cleveland Worm, Farval name Mark-Costello representative

Mark-Costello Co., newly organized sales engineering agency in Los Angeles, has been appointed to represent Cleveland Worm & Gear Co. and its affiliate, the Farval Corp. in Arizona and Southern California.

Principals in the new company are T. R. Costello and R. S. Markle. Both have had experience in mechanical power transmission and lubrication.

Brooks & Perkins opens West Coast division

Brooks & Perkins, Inc., has opened a West Coast engineering division in North Hollywood, Calif. The division will handle engineering programs involving magnesium and titanium.

Manager of engineering for the new division is Donald L. Erickson, who has been on the West Coast for the

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are 1/4 inch short of contracted space to allow for borders and composition. Rates are \$9.00 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

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STEEL TANKS—IMMEDIATE DELIVERY—10—7,316 gal. & 20—7,100 gal. ea. welded steel tanks, one-piece, dished & flanged heads, will withstand pressure, have been removed from food processing plants in Western New York, now stored in railroad yard for immediate inspection & shipment, priced as low as 5c per gal. depending upon quantity ordered, inspection invited, write for complete listings, dimensions & other tanks available. Box 9-A, Western Farm Equipment, 609 Mission St., San Francisco.

WATER FILTERS—Used Niagara diatomaceous earth filters, capacity 300-400 gpm ea. with 15 Niagara leaves & total area of 330 sq. ft. in each of 2 filters; this capacity can be increased by one-third, with quick opening patented cover, pumps & accessories, available immediate delivery, price less than half of new, inspection invited. Box 9-B, Western Farm Equipment, 609 Mission St., San Francisco.

ELLIOTT STEAM GENERATOR—200 KW steam turbine generator, can be used either for AC or DC, cost approx. \$20,000, available Memphis, Tenn., price 25c on the dollar. Box 9-C, Western Farm Equipment, 609 Mission St., San Francisco.

past year giving engineering assistance from the firm's West Coast sales office in Beverly Hills.

J. L. Stuart to construct \$750,000 canvas plant

J. L. Stuart Manufacturing Co. has announced plans to construct a \$750,000 plant in an industrial park in South San Francisco. The plant will consolidate the operations of the canvas products manufacturer which now operates in three locations. Plant should be completed in about a year.

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Garlinghouse, Fremont opens new Los Angeles center

Garlinghouse, Fremont & Co., distributor of construction and industrial equipment, held its official open house at its new display and office building in Los Angeles. Highlight of the occasion was a continuous field demonstration of assorted equipment in the adjoining yard.

The 6,000 sq. ft. building is located on 1 1/2 acres of land. Complete service facilities are housed in a 2,500-sq. ft. building at the rear.



COMPLETE SERVICE FACILITIES are housed in a 2,500-sq. ft. building behind Garlinghouse, Fremont & Co.'s recently occupied new display and office building in Los Angeles. The 6,000-sq. ft. main building is located on 1 1/2 acres of land.

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Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

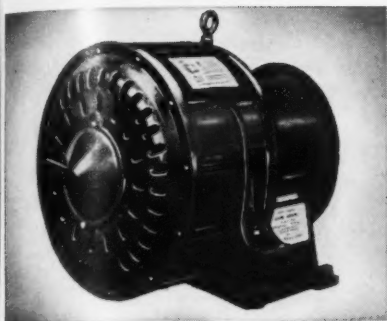
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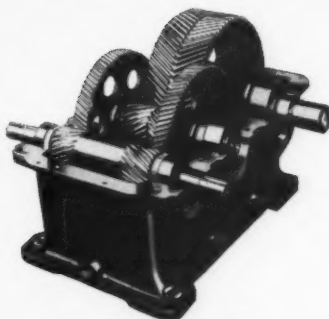
A. P. JOHNSTON CO., INC.
1845 E. 57th St., Los Angeles 58

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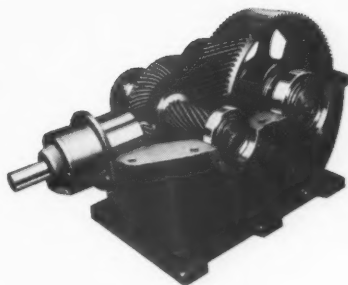
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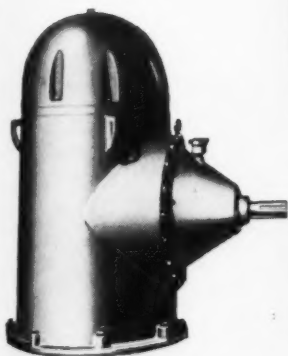
Western Gear Torq-Master Transmission, for use with torque converters



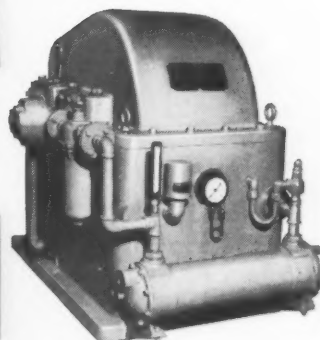
Herringbone gear speed reducer



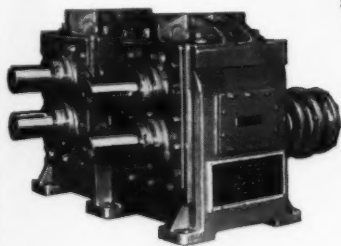
Right angle speed reducer



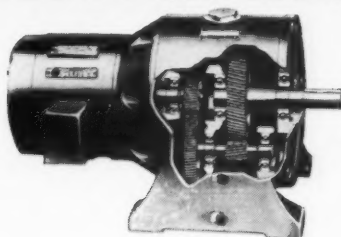
Right angle vertical pump drive



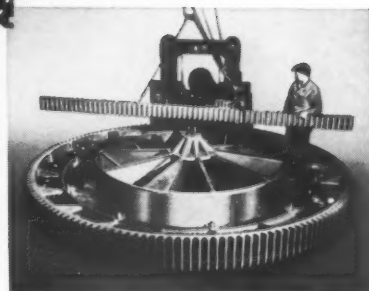
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Western Industry

October
1956

Vol. XXI, No. 10



**THE 50 BEST
AVAILABLE
MANUALS ON
TODAY'S
INDUSTRIAL
PUMPS
yours for
the asking
... p. 68**



A big reason for the Clark Electrics at Associated Grocers, Seattle, Washington, is the dependable service offered by Preston Foller Co., Seattle. This service is typical of all Clark dealers.

Clark Electrics at Associated Grocers

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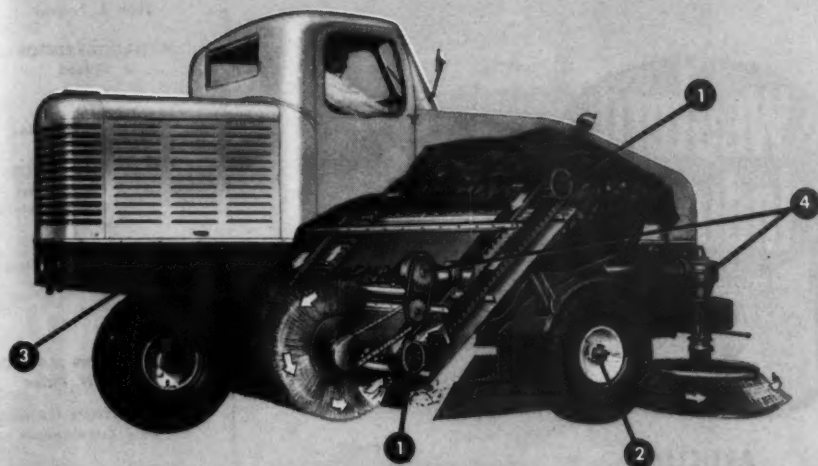
and guaranteed for quality. And he provides a completely equipped shop for rebuilding, a fleet of rental trucks to help you over peak work loads. Fact is, he offers a *complete* service package. Look in the Yellow Pages under "Trucks, Industrial" for the Clark dealer nearest you.

A BETTER BUY WITH LOCAL SUPPLY—*Genuine Clark Parts*

**CLARK®
EQUIPMENT**

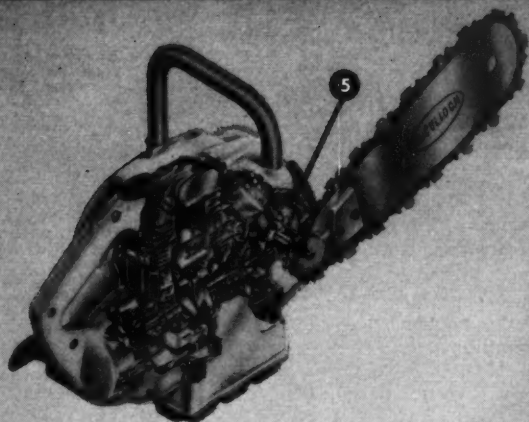
Industrial Truck Division
**CLARK EQUIPMENT
COMPANY**
Battle Creek 28, Michigan

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Photos, Courtesy of Wayne Manufacturing Co. and McCulloch Motors Corp.

from **A to Z** in **AZUSA**



- 1 Elevator sprocket hubs
- 2 Front axle
- 3 Rear axle pivot
- 4 Ring gear spindle
- 5 Gears

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Our engineers are prepared to work with you. Please phone us collect when you have a "forging" problem.

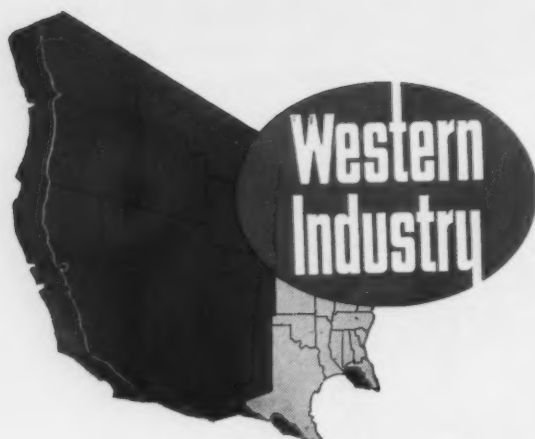
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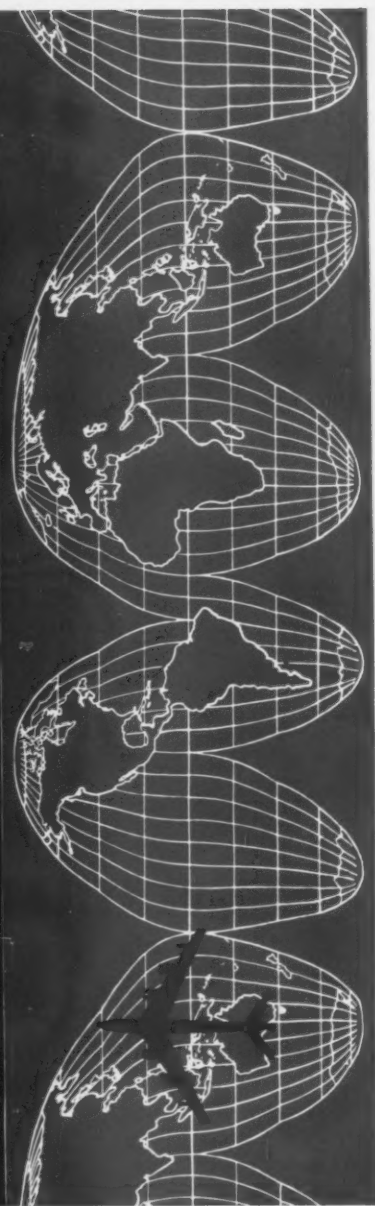


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Serving Plant Operating Executives in the Nation's Fastest Growing Region



Operator Richard Scribner examines three-dimensional milling machine as plant engineer R. A. Forrest, left, and maintenance supt. Richard A. Keating watch from below.

IMPORTANT things are happening at the Kaiser Aircraft and Electronics Corp. plant at Richmond, Calif.

Working to tolerances as fine as .002 inch, 26 Keller BG22 three-dimensional milling machines turn out aluminum and steel forgings for use as structural elements in Boeing's B-52 intercontinental bomber.

Protecting this expensive machinery, as well as other units in the Kaiser plant, are the Mobil lubricants recommended by General Petroleum lube engineers.

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COLT**



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Ventilator
with weather-
proof louvers



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Prehistoric monster?

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Imagine the brute power it takes to move this behemoth—even more, the joint-strength it needs to hang together despite the strains and stresses it undergoes! It typifies what's been happening in the earthmoving equipment field. They're making them bigger, more powerful, more rugged.

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Plenty of standard nuts and bolts. They have to be strong and flawless, these fasteners... completely reliable.

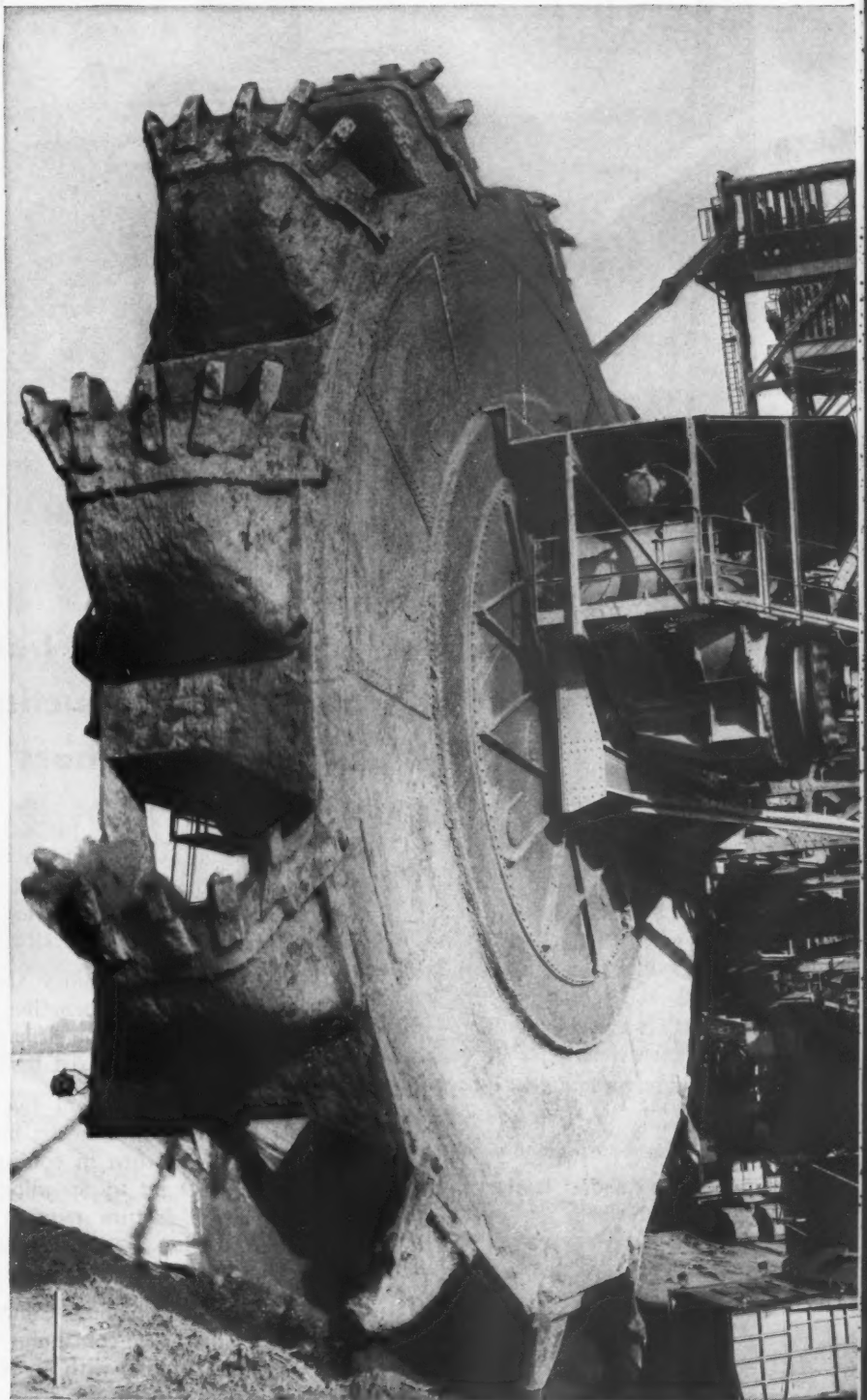
RB&W—A MAJOR AND RELIABLE SUPPLIER
A leader for 111 years, RB&W turns out the finest quality fasteners possible—for the heavy equipment field as for so many other major fields in industry. Modern facilities, new techniques, long experience... all combine to make RB&W fasteners truly the "strong point of any assembly".

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RB&W FASTENERS - *Strong Point of any assembly*

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Bucket capacity

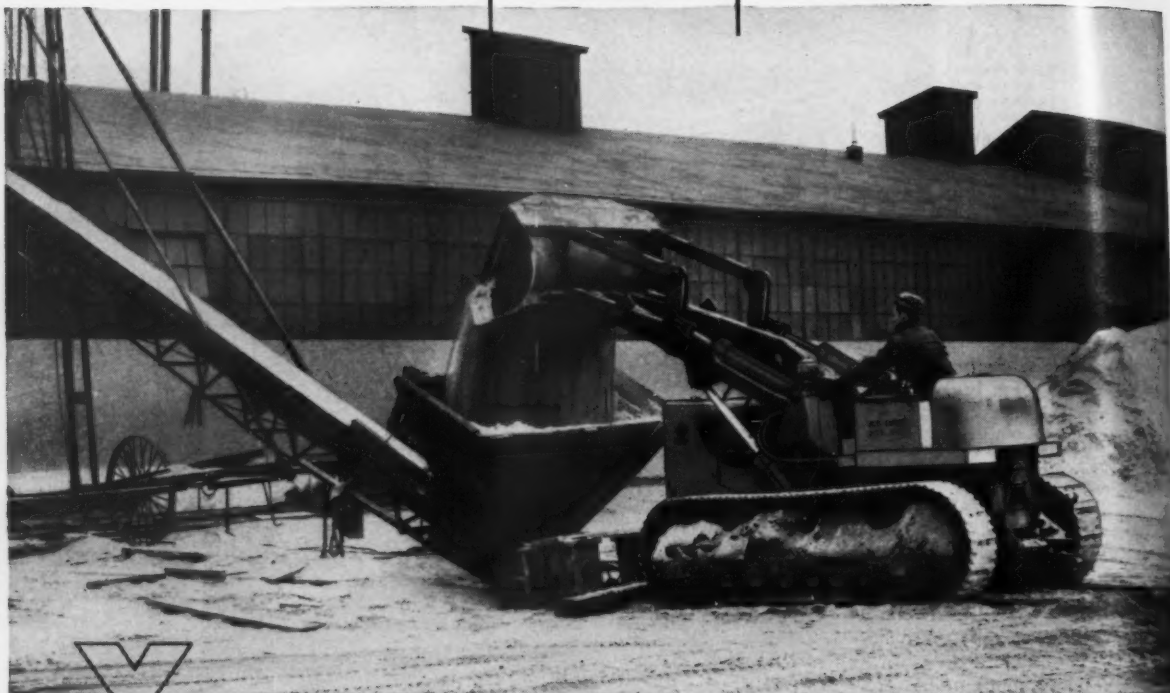
1½ cu yd

Belt hp

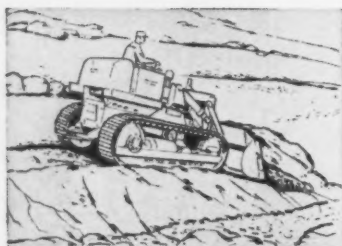
68.5

Weight

19,600 lb

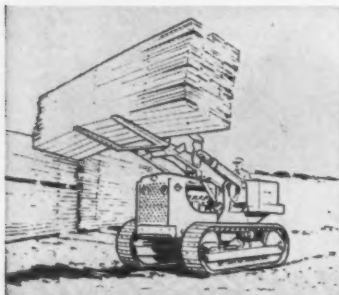


**ou can mechanize material handling without
plant alterations or production shutdowns
with an Allis-Chalmers HD-6G**



"... has power to dig hard-packed material."

"... also handles lumber, pipe or palletized loads."



When you put an Allis-Chalmers HD-6G on the job, it starts moving materials immediately . . . saving time and labor for you right from the start. Its adaptability enables you to fit it in with your present setup. There is nothing to install . . . no time out for plant alterations.

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The HD-6G is excellent for many materials handling assignments. It has the power to dig into hard-packed materials and the maneuverability to turn in confined areas. There is a fast reverse that increases output by speeding the loading cycle. Its thousand-hour lubrication feature reduces daily maintenance time. Interchangeable attachments quickly adapt it for handling lumber, pipe, packaged or palletized materials.

Ask your Allis-Chalmers Construction Machinery dealer to show you the immediate and continuing benefits you get when you mechanize materials handling with an HD-6G.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



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New Lightweight **SKIL** Sander For Production Plants Gives 30% More Power

SKIL's new Disc Sander, Model 851, is giving industry important help with finishing problems. Here is a tool that is lightweight and easy-to-handle . . . with extra power to meet bigger de-

mands. In rugged on-the-job service, the new 851 proves that it can deliver more work on a variety of tasks . . . with far less maintenance than any comparable sander.



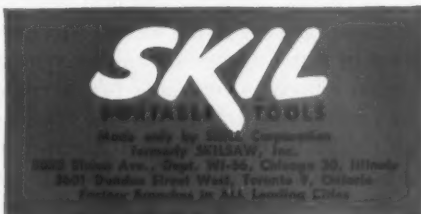
These Are Some Of The Other Exclusive Features Offered By SKIL:

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FREE! Let your SKIL Distributor show you in a convincing demonstration and **FREE** trial . . . that "SKIL is the ANSWER" to your metal finishing bottle-necks! Write for information and literature.

Other Big Features Make SKIL Your Best Buy In Disc Sanders!

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- **TRIGGER SWITCH** . . . for greater comfort in use!
- **SPINDLE LOCK** . . . makes accessory changes far easier!



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HOW MANY OF THE "PRIME'S" ENGINEERS CAN FIT INTO A VENDOR'S SMALL PLANT?

This is the question that is causing some mighty short tempers and heated words (mostly in private) these days in many Western small plants. And it is raising another pertinent question: *"How much valuable engineering time in this day of engineer shortages is needlessly diverted to visits by government engineers and inspectors to the plants of prime contractors, and visits by the prime's engineer teams to vendor plants?"*

WI editors have received a series of complaints from managers of vendor plants, with the accompanying expletives ranging from "somewhat irritated" to "d— disgusted." The latest cases: A man in business just four weeks, and with only four people in his plant, was visited during a three-week period by teams of three to eight men from *nine* different prime contractors. In another case, the register of a small company showed that *eight* individuals from *one* prime made *separate* calls between 10 a. m. and 3 p. m. of a single day. Many plants with 20 to 50 employees report that the total number of engineers from primes visiting their plants each month is 100 or more.

Meanwhile, prime contractors are doing some complaining of their own—about "government engineer-inspectors in every aisle and at every corner in the plant," and "teams of visiting inspection boards that number up to 200 men or more, treading on each other's toes and getting in the way of employees and production."

How did it all get started? . . . and what alleviatory action can be taken? Answer to the first question is already historical; answer to the second will have to be worked out in frank discussion and by sympathetic cooperation among government procurement officials, prime contractors, and the harried vendors.

Most of the complainants blame the government for setting the bad example to begin with, with prime contractors unfortunately adopting many of the gov-

ernment's patterns. The government, through three wars and under urgent necessity, has become the country's largest purchaser (with the armed forces alone buying one-sixth of the nation's production). Procurement on this scale has in many cases led to duplication of effort, with separate agencies becoming jealous of prerogatives and resentful of intrusion from other agencies. This has been the spawning ground for the abundant numbers of government engineer teams in prime contractor plants . . . and for the complaints by the primes of confusion and waste, both of government engineer talent and time and that of the prime's own engineers.

Compare the prime's complaints about the government's inspection and survey methods with the vendor's complaints about the prime's methods, and there appears a striking similarity. Vendor's engineers become bitter about having to answer the same questions again and again for representatives of the same prime contractor. And they say that the prime's engineering teams are made up of men representing different "agencies," with jurisdictional jealousies not far different than those characteristic of the government units.

The vendors cite the following as an example of a typical prime team set-up: an eight-man team made up of a representative from the Factory, one from Industrial Engineering, another from Tool & Production Planning, one from Tool Design, one from Engineering, a representative from Cost Accounting, one from Quality Control, and an eighth from the Material Department.

As one vendor says: "Representatives from these different departments are limited in jurisdiction, and woe betide the individual who steps over the line." Often, such teams are cramped for sitting (or standing) space when they enter a prospective supplier's office, and they get in the way of each other and of workers as they slowly tour the plant.

How do the engineers themselves feel about being involved in the team visits to vendor plants, knowing that the vendors often call such visits "routine shake-downs?" It is perhaps significant that a recent "off the record" survey of engineering turnover in one large missile plant turned up the fact that 90% of the changes were caused by "frustration," and not by salary or other conditions. The typical engineer, basically a creator and an independent thinker, has a natural distaste for any job activity that divorces him from full time creative use of his engineering skills, particularly where he may feel he is being compelled to "go along with the mob."

Just as prime contractors have had some ideas about how government agencies can modify their survey and inspection techniques, the vendors have some ideas too about ways that the primes can change their purchasing habits. They suggest, for

. . . continued on page 16

HYSTER INDUSTRIAL TRUCKS ARE BUILT TO DO THE HEAVY WORK



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Pittsburg, Calif.

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13

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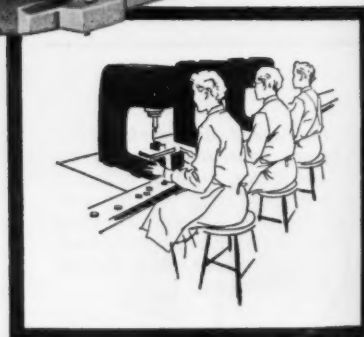
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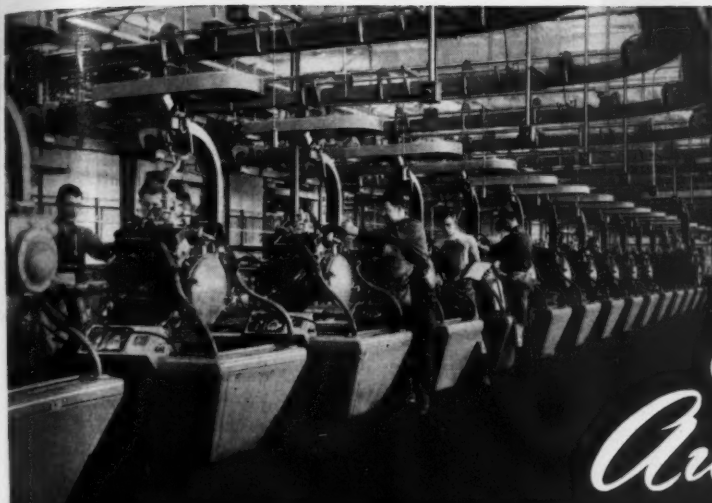
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Columbus 16, Ohio



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WESTERN INDUSTRY — October 1956



ENGINE TEST DEPARTMENT

Engines are automatically routed onto free lines feeding into the test stand area. They seek out empty test stands automatically.



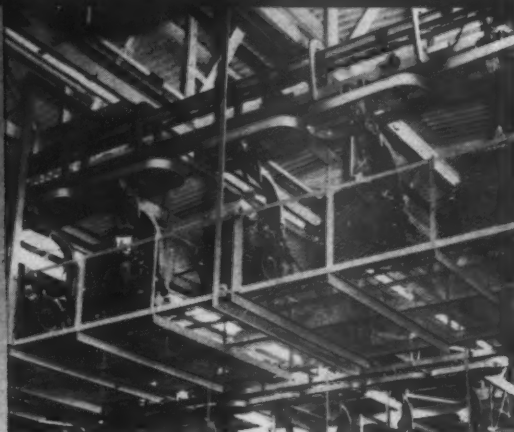
Overhead Automation

OF MATERIALS MOVEMENT AND STORAGE

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This Webb power and free conveyor system provides considerable flexibility in plant operation. It permits greater control in work flow, allows varying speeds between conveyors in the system, permits materials to be switched automatically onto free lines for stationary operations and storage, and simplifies transfer of loads between conveyors.

If you are looking for greater efficiency in your materials handling operations . . . if you are looking for additional floor space . . . for added profits from lowered production costs, contact your nearest Webb office. Write for Catalog No. 52.

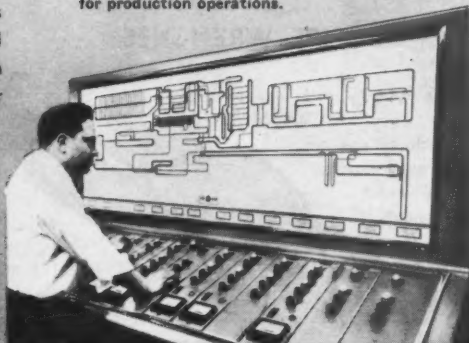


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This control console provides complete synchronization of the 14 conveyor lines. The entire system is displayed on the vertical panel. Calibrating dials on the console permit the changing of speed for conveyors in the system as desired.



JERVIS B. WEBB CO. of CALIFORNIA

Specialists in Custom Conveyor Systems

9301 RAYO AVENUE

SOUTH GATE, CALIFORNIA

OTHER WESTERN OFFICES

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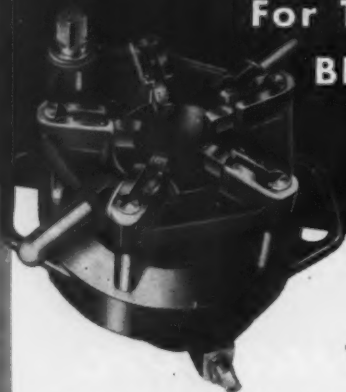
52 W. 2ND S. STREET
SALT LAKE CITY, UTAH

FACTORIES: DETROIT • ATLANTA • LOS ANGELES • HAMILTON, ONT., CANADA • ENGLAND • FRANCE • AUSTRALIA

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WESTERN INDUSTRY — October 1956

PRECISION THREADING For The BIG Ones



Model
2 and 2BR

GEARED PIPE THREADERS

Here's true accuracy with the exclusive TOLEDO receding die principle—best for deep sealing, smooth tapering pipe threads for 2½ to 4" pipe or conduit. Cuts standard, over or undersize threads. Excellent for steel, wrought iron, brass, copper or cast iron pipe. Simple construction—easy to set up and use. Take our tip—it's tops.



WORKS AS GOOD AS IT LOOKS

This 75 lbs. power vise makes threading, cutting and reaming a fast, simplified operation when out on the job. Carry it practically anywhere. Sturdy tripod legs, self-centering jaws and quick-acting wrenchless chuck. Polished aluminum housing—dependable geared action—precision construction throughout. Get your order in early for this fast-moving profit maker.

TOLEDO PIPE WRENCHES

The wrench for everyday work load punishment. Unconditionally guaranteed TOLEDO quality. Sturdy frame and jaw, positive grip, quick easy adjustment. The wrench for your heavy-duty jobs. See it today. Try it out.



THE TOLEDO PIPE THREADING MACHINE CO. • TOLEDO 4, OHIO

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

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16

VIEWS & COMMENT

... continued from page 10

example, that the primes let specialists from their purchasing departments handle all procurement. Or that the primes employ outside specialists whose men devote their entire time to vendor surveys and to vendor evaluations for purchasing. Either system could promote efficiency and do away with jurisdictional feuding—as well as eliminate most of the vendors' too-many-visitor headaches.

Perhaps of even greater value would be a by-product—in the face of today's engineering shortage, a reduction of engineering wastage!

THE BEST HELP A MANUFACTURER CAN OBTAIN IS OFTEN FREE these days, a rather surprising fact frequently overlooked by the West's plant operating executives. During no past period have we seen such a rapid development of special consulting and service plans that offer so many completely tangible benefits for Western plants, at low or no initial cost.

In WI this month and last month alone, we have described four such plans—a utility cost control program that doesn't cost a cent if it doesn't save plant dollars (page 69, September issue); the cost cutting possibilities offered by the modern freight forwarders (page 65 of this issue); how the relatively new contract packaging firms can often do your packaging jobs more economically than you can (page 58); and a free color engineering consulting service that shows how to use color to increase your plant's efficiency (page 46).

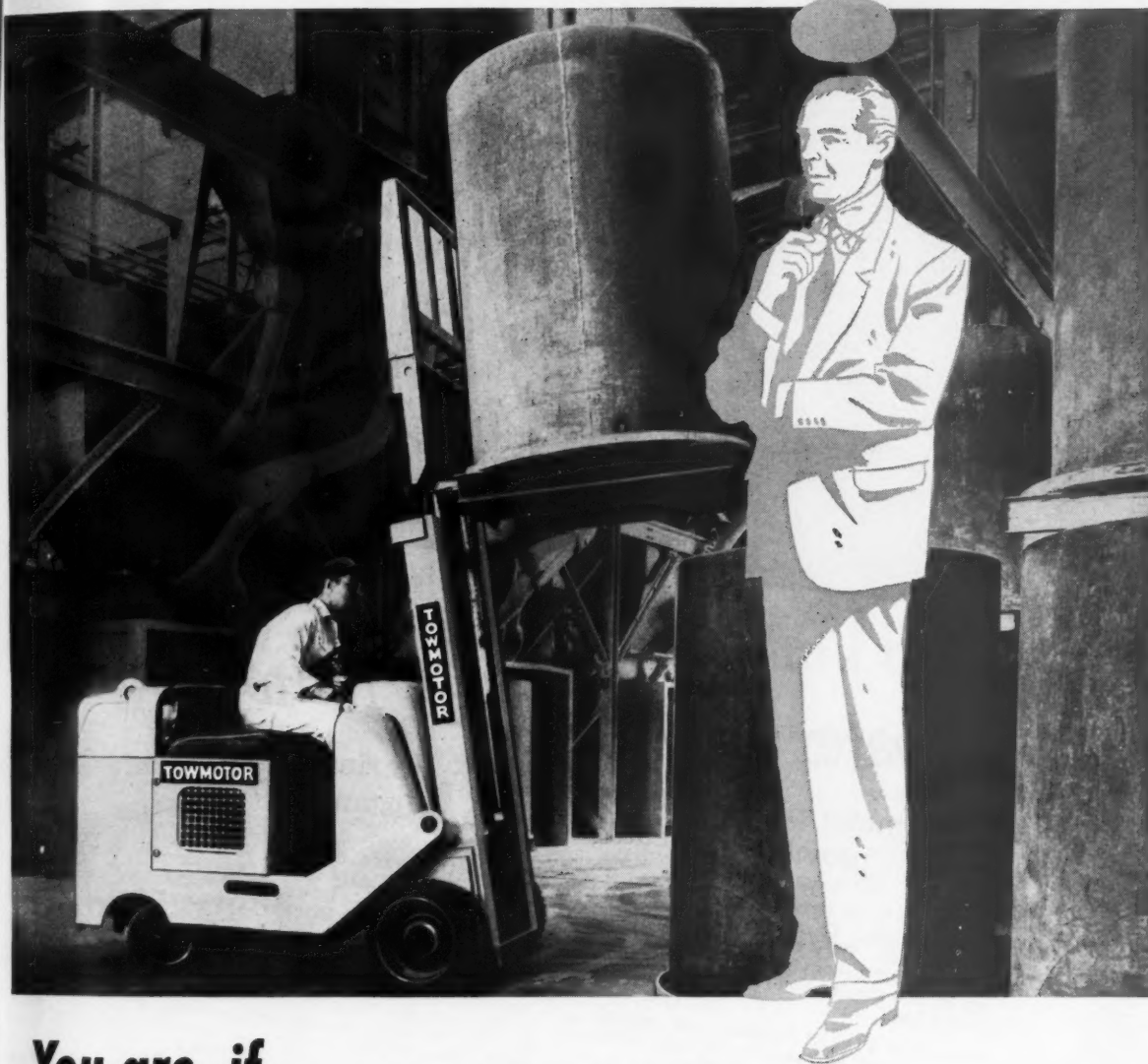
We'll continue to tip you off about these easy and low-cost ways to improve your operations, but from that point on—it's up to you.

"TOP STORY" AWARD FOR WI LAST MONTH



... was presented during the California State Fair on Sept. 1, accompanied by a magnificent plaque and a handshake from California's Governor Goodwin J. Knight, with Jack Timmer, WI Editor, on the receiving end of the gubernatorial handclasp in photo at left. The top story? It was WI's special on-the-spot report by Larry Wilson, WI Managing Editor, of plant clean-up after the "Christmas-Eve" floods last winter, as it appeared in the February 1956 issue. WI was the only magazine to rate an award in the annual contest (remainder went to TV and radio stations and newspapers).

Am I ready for a Towmotor?



You are, if your present handling operation is *not* fully mechanized, and requires: (1) 3 or more full-time workmen. (2) Movement of heavy or bulky unit loads.

In today's competitive market, you must step up your business operations with efficient handling methods. To discover how *your* firm can speed handling, eliminate "bottlenecks" in the flow of materials, and make maximum use of storage space, call your Towmotor representative today. He'll show you how to cut handling costs and open the door to *greater profit*. Write for certified Job Studies covering *your* industry. TOWMOTOR CORPORATION, Div. 6710, 1226 E. 152nd St., Cleveland 10, Ohio.

America's best engineered fork lift truck

THERE'S ONLY ONE FORK LIFT TRUCK CALLED TOWMOTOR

Read how other companies use Towmotors to economize NOW!

Food: Ask for Job Study #101
Warehousing: Ask for Job Study #98
Transportation: Ask for Job Study #97
Newspaper: Ask for Job Study #96
Metal: Ask for Job Study #95

TOWMOTOR
 THE ONE-MAN-GANG

... for more details, circle No. 14 on Reader Service Postcard

STANDARD OPEN DRIP-PROOF
LOUIS ALLIS MOTOR

PLASTIC SHIELD COVERS FLYWHEEL
TO PREVENT SPLASHING

MOTOR IMMERSED IN WATER

In water 1½ years...still running

Dramatic proof that Louis Allis motor insulation
provides unusual moisture resistance

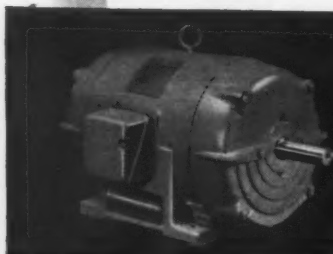
We wouldn't do this to a motor. But somebody did, to check our new insulation. They took a standard open drip-proof motor, placed it in water up to the shaft, and ran it a year and a half.

The motor will still run, too, which proves that our insulating materials are of top quality. One of our exclusive features is the new phenolic impregnating varnish we use. As you

can see, this varnish resists moisture, but it also has excellent thermal and chemical resistance and is not susceptible to embrittlement.

Insulation usually determines the life of a motor. That's why the insulating materials used in the new L. A. line are the product of years of continuous research and development. That's why Louis Allis motors run longer . . . give less trouble.

Find out the many other advantages available to you in the new L. A. line of motors. Write for our new bulletin No. 1700.



A complete line of standard rated motors in frames 182 through 326U now in stock. Special rated motors are available on short delivery.

LA-107



THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

... for more details, circle No. 15 on Reader Service Postcard
WESTERN INDUSTRY — October 1956

Can one grease tackle
all these greasing problems?

HIGH GREASE COSTS

HEAT

COLD

INVENTORY MUDDLES

MOISTURE

GREASING ERRORS



Yes . . . and here's how—with the
help of Shell men and techniques

Shell men knew plant operators *needed* a multi-purpose grease—to simplify inventory problems, to cut greasing errors. But could one be formulated that would withstand such adverse conditions as *heat*, *moisture*, and *low-temperature operation*?

Shell Research men set to work to find out. After extensive testing they developed SHELL ALVANIA GREASE, the revolutionary new multi-purpose lubricant.

Put to the most severe tests, Shell Alvania withstands *both* high and low temperatures, as well as wet operation (Alvania is water resistant and inhibits corrosion).

Because of its outstanding mechanical and oxidation stability, Alvania stays in the bearings longer, extends time between greasings. And because it serves for practically every application in most plants, Alvania can help you reduce grease costs and greasing errors.

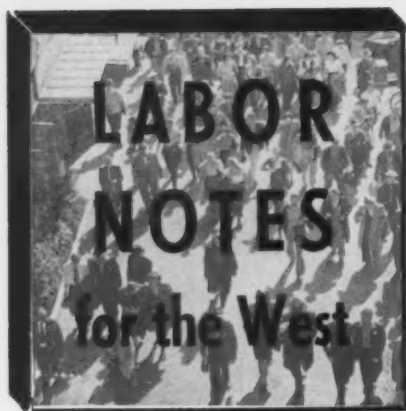
Alvania Grease is just one of many fine products developed by Shell's 1500-man research team—a team with 25 years' experience in lubrication problems.

A telephone call can put this team to work solving your special problems. Why not call in your Shell representative today?



SHELL ALVANIA GREASE

... for more details, circle No. 16 on Reader Service Postcard



EMPLOYEES IN SEVEN WESTERN STATES MUST BE ALLOWED TIME OFF TO VOTE—and each of the states assesses some sort of penalty if employers do not make such allowances in appropriate cases, in accordance with the individual state laws. Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, as well as the territories of Hawaii and Alaska, all have such laws.

The laws vary some from state to state, but they follow a general pattern. Usually they provide that an employee who is entitled to vote may leave work for a specified period without penalty or loss of wages to go to the polls. The employee must apply to his employer for the time off in advance and the employer will designate the time. The laws indicate what employees are covered (in most cases this is all workers), the amount of time that may be taken off, and the conditions under which it is permitted. All the voting laws of the seven Western states and two territories provide for penalties where an employer refuses the privileges granted by the laws.

Here's a brief rundown of pertinent legislation enacted in the West:

Arizona's legislation covers only general elections but applies to any person entitled to vote. An employee may take two hours off between opening and closing of the polls without penalty or loss of wages. However, he must apply to the employer for the time before election day and the employer may specify the hours of absence.

California's registered voter may have time off to vote in general, direct primary, and presidential primary elections, if he does not have enough time outside of working hours. Four hours between the opening of the polls and the beginning of the work shift, or four hours between the end of the work shift and the closing of the polls is considered enough time to vote outside of working hours. If the employee has less than this he may take time off at the beginning or end of his work period, the maximum amount without pay loss being two hours. To take this time off the employee must give two working days' notice to his employer.

Colorado has two provisions, one covering general and primary and the other municipal elections. In both cases they apply to any person entitled to vote. The provisions allow an employee to take two hours off between the opening and closing of the polls without penalty or loss of salary except where the employee is paid by the hour. The employer may decide the hours of absence.

In Nevada, anyone entitled to vote in any election may take from one to three hours off if he doesn't have time to vote before or after work. He must apply for the time be-

fore election day and the employer may designate time of absence.

New Mexico's law says that any registered voter may take two hours off to vote in any election. Employer can specify the time.

Utah's law, covering general elections, says that any person entitled to vote may have two hours off without penalty, and without deduction in salary except where he is paid by the hour. The employee must apply for the time off prior to election day and the employer may say when.

In Wyoming, general and primary elections are covered by the state's laws. Anyone entitled to vote may take one hour other than meal periods, without penalty, provided he casts his vote. The hour will be at the convenience of the employer.

In Alaska, a qualified voter may take two consecutive hours between the opening of the polls and the beginning of his work shift or end of work shift and close of polls to vote in any territorial, municipal, or other public election.

In Hawaii, anyone eligible and registered may have two hours to vote in general, primary, or special elections. However, if the employee takes the time off and fails to vote and the employer can verify the fact, the employer can deduct the appropriate amount from the employee's salary. The law does not apply if there are two consecutive hours, excluding lunch or rest periods, when the polls are open and the employee is not working.

All of the eleven Western states, except New Mexico, and the two territories permit eligible voters who are out of the state to vote by mail in the general elections.

If you want more complete information on the laws briefed above, write to the U. S. Department of Labor, Bureau of Labor Standards, Washington 25, D. C., and ask for Bulletin 138, "Time Off for Voting . . . Under State Law."

LOOKING FOR THE NEAR-PERFECT EMPLOYEE? Take a tip from Ryan Aeronautical Co. in San Diego, Calif., and look to the physically handicapped. Ryan, employing close to 100 men and women who at some time in their lives experienced mishaps which put them into the statistical



JAMES LLOYD joined Ryan 13 years ago as a member of the all-deaf planishing department. Since the decline in planish work he has been operating a DoAll saw. Lloyd "talks" to foreman and fellow workers by means of his ever-present pad and pencil.

handicap column, is enthusiastic about the low absenteeism and turnover rate, high efficiency, geniality, and devotion to duty exhibited by its handicapped employees. And, job-wise, some of Ryan's employees consider their handicaps disguised blessings. Example: deaf operators working rackets planishing machines.

Ryan's policy of hiring the handicapped dates from long before World War II, although its handicapped forces swelled during the 1940's when handicapped people responded to emergency calls for aircraft workers. This was when Ryan staffed its noisy planishing department with deaf mutes. Recently, as Ryan has turned more

... continued on page 24

STANDARD ENGINEER'S FIELD REPORT

PRODUCT STANDARD ROOF COATINGS

FIRM PAUL SCHATZ FURNITURE CO.
Portland, Oregon

Coating stops wall moisture—no leaks in 5 years

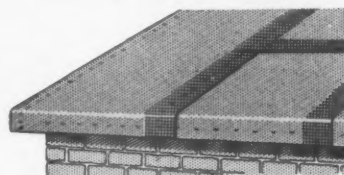


Closeup of Wall shows how free-flowing Standard Aluminum Asbestos Coating penetrates porous concrete, forms moisture-proof "blanket" over entire surface.



Prior to Application of Standard Aluminum Asbestos Coating, wall leaks had ruined costly interior decoration, subjected large inventory of fine furniture, like piece shown by Mr. Schatz (above), to damaging moisture.

How Standard Roof Coatings weatherproof prepared-paper, metal, concrete, brick



- Coating flows freely, adheres firmly, tightly seals cracks, seams, nail holes • Stays pliable, reflects heat—may be sprayed, brushed or applied with squeegee.

Concrete Wall of this Portland, Oregon, furniture store, sealed with Standard Aluminum Asbestos Coating, is still weatherproof after 5 years' exposure to the full force of prevailing winds and rainstorms. Store owner, Paul Schatz (above), says, "This product has given us excellent moisture protection for 5 years, with an exceptionally attractive appearance."

Building was completed in 1949, later developed several leaks in west wall which caused considerable damage to interior. In 1951, Standard Aluminum Asbestos Coating was applied to entire 50 by 150-foot area of this wall. Product immediately stopped all leaks and none have developed since. Interior surface has remained dry, shows no evidence of stains or dampness.



For More Information about Standard Roofing Products, call your Standard Representative, or write 225 Bush St., San Francisco, California.

STANDARD OIL COMPANY OF CALIFORNIA



SAVE SPACE—Using ELPAR high lift trucks, a foundry devised a special core handling system that doubled effective use of their storage area. Trucks speedily high tier racks of fragile cores without damaging them.



SAVE STOCK—Using ELPAR roll clamp trucks, corrugated box maker has reduced paper damage to almost zero. Unique ELPAR clamp handles rolls from 51" in diameter down to small butt rolls without manual adjustment.

SAVE

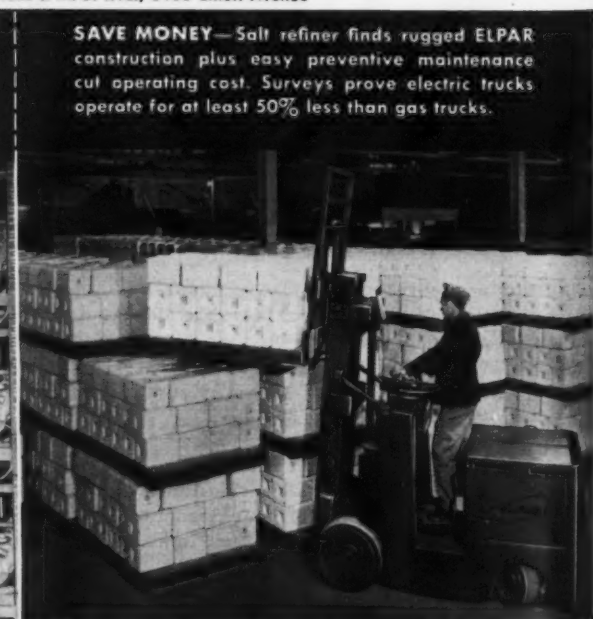
WITH **ELPAR** TRUCKS

66% of the 75 largest U.S. manufacturers use ELPAR trucks because their savings soon repay the truck investment. You can save, too! Write for complete ELPAR catalog.

ELWELL-PARKER ELECTRIC CO. WESTERN REPRESENTATIVES:
 Los Angeles . . . J. W. LAFFERTY CO., 5422 E. Washington Boulevard
 San Francisco . . . IRA G. PERIN CO., 575 Howard Street
 Seattle . . . COLBY STEEL & MFG. INC., 3155 Elliott Avenue



SAVE DOWNTIME—"Split-second" deliveries to their automated assembly line are a must at Studebaker-Packard. Built-in dependability of ELPAR trucks keeps them always on the job, preventing costly bottlenecks.



SAVE MONEY—Salt refiner finds rugged ELPAR construction plus easy preventive maintenance cut operating cost. Surveys prove electric trucks operate for at least 50% less than gas trucks.

POINT OF ORDER...



... when you let
REPUBLIC SUPPLY
your needs!



NO FEET ON THESE DESKS...

Industrial specialists handle orders with personalized promptness.

FACTS AT THEIR FINGERTIPS

Oil's large library provides technical data quickly and correctly.



Here's a brief glimpse into the everyday activity of Republic's *Oil* and *Industrial* Order Departments.

Republic specialists process thousands of orders a day...for pipe, valves, and abrasives, shop supplies and metal cutting tools...any of the more than 35,000 different industrial and oil field items stocked by Republic.

There are two separate departments—Oil and Industrial—yet only one person in each department handles your order from start to finish. That means you get personalized service and special attention from one responsible person.

That's performance plus...the kind of performance that saves you time and money. Next time you need an item—oil or industrial—call Republic. Then relax. You're in capable hands.



THE BELLE SYSTEM

Incoming calls get the green light.

THE *republic supply* **COMPANY OF CALIFORNIA**

Main offices in Los Angeles & San Leandro. Phones—Los Angeles: RAYmond 3-2511, Parkview 8-7151; San Leandro: LOCKhaven 2-0414, Enterprise 1-1060
Pipe, valves & fittings • abrasives • shop supplies & tools • rigging materials • industrial rubber products • machinery • oil field supplies • fire equipment

An independently owned and operated company serving Western Industry

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WESTERN INDUSTRY — October 1956



Join the throng of **SLICK** 'regulars'

SLICK TEAMWORK

in speeding shipments...
lowered rates (by as much
as 58%)... new low minimum
(down to a dollar)...
stepped-up flight schedules (All-cargo
DC-6A overnight service to New York, overnight
and direct service tying the Midwest and also
Texas to the Pacific Coast)... all these SLICK
innovations are bringing cheers from our
growing roster of regular customers.
Compare a typical thirty pound shipment... see for
yourself why... even in freight savings alone...
IT PAYS ALL WAYS TO SHIP VIA SLICK!

Between LOS ANGELES and New York	\$4.50
Between SAN FRANCISCO and Boston	\$5.10
Between SAN DIEGO and Detroit	\$3.90

Call your nearest **SLICK** office
for more details today.

SLICK
THE AIR FREIGHT LINE

3000 N. Clybourn Avenue Burbank, California
... for more details, circle No. 20 on Reader Service Postcard
24



LABOR NOTES

... continued from page 20

and more to jet engine manufacture, with an accompanying decline in manifold business and, consequently, planishing, it has absorbed its deaf operators into other departments. There was never any question of laying them off; they had established their reputations as reliable craftsmen. They have quickly learned new skills in welding, aircraft assembly, and saw and router operation.

Typical example of these quick-to-learn employees is James Lloyd (see picture.) Deaf from birth, he started in the planishing department in 1942, later transferred to assembly work and then, at the company's request, learned



LOSS OF HIS LEFT LEG has not prevented Joseph Gratton, a Navy veteran, from becoming a skilled milling machine operator at Ryan Aeronautical Co.

to run a DoAll saw, which he operates today. Lloyd "talks" to his foreman and fellow workers by means of an ever-present pad and pencil, is widely known all over the plant, and is considering ways of teaching himself new skills so he can work on jet engines, which he finds extraordinarily interesting.

Handicapped people are hired on the basis of their abilities and characters, and the only extra consideration given a handicap is in regard to safety. Naturally Ryan won't hire a man for a job in which his handicap would



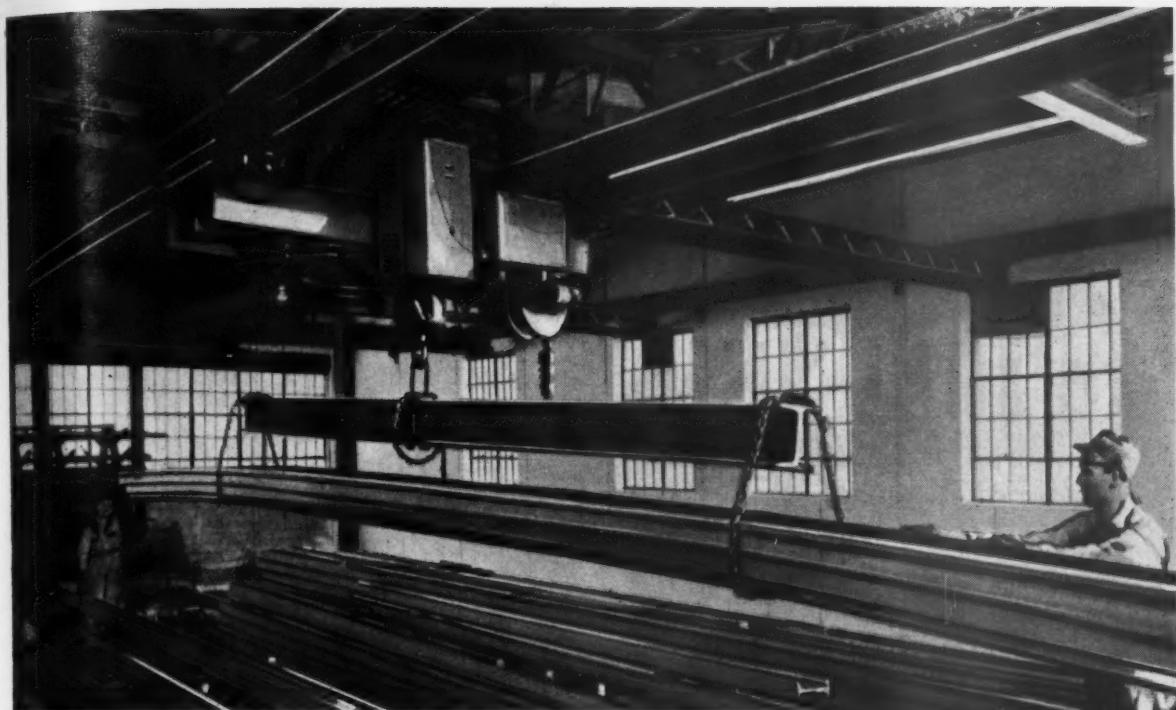
MABEL LLOYD, who is deaf, has been with Ryan seven years as a heliarc welder. Ryan hires more than 50% of handicapped applicants, has found them to be good and permanent employees.

add an element of danger for himself or others. According to Lester E. Gehres, Ryan's manager of employee services, the firm employs physically handicapped men and women in 41 of its 133 departments, in jobs ranging from engineer and master mechanic through machine operator, contract analyst and parts repairman to secretary.

More than 50% of handicapped applicants are hired at Ryan, which at first glance seems rather high. But very few of these men and women are transients, which is not true of a lot of aircraft job seekers, and most of them have been recommended to Ryan.

Non-discrimination is a key to the program's success, Ryan feels. The relationship is a business association, mutually beneficial to both Ryan and the handicapped workers. Everyone likes it that way.

... continued on page 24



Potentially, it's the best

And Louden has the equipment, the experience and the engineering to turn its advantages to greatest account

For many types of materials in many kinds of plants, overhead handling does indeed offer inherent advantages over other methods of handling. And Louden engineering, experience and range of equipment turn these advantages to greatest account. The Union Iron & Steel Company, Inc., shows how. Largest independent in Cincinnati, Union warehouses steel bars, plates and sheets to be cut and shipped to order. Union had overhead handling before, a crane that unloaded stock from freight cars and transferred its load roundabout to one of 4 parallel monorail tracks. But this resulted in slow handling and "dead" spots in storage.

Louden proposed an unusual installation with crane operating in the di-

agonal position to conform to the angle of the railroad siding at the rear of the building. This direct, flexible, straight-line handling would give inch by inch coverage of the storage area. Louden equipment was installed and it reduced unloading time from 4 hours for a 50-ton car to 50 minutes—a ton a minute. With every foot of space utilizable, Union gained 25% in storage capacity. Handling of stock to cutting machines was greatly expedited as well.

The difference lies in engineering concept. Louden's long experience gives a resourcefulness and flexibility of approach, an ability to deliver better handling to you. Your plans should include a consultation with Louden experts.

THE LOUDEN MACHINERY COMPANY
6110 Superior, Fairfield, Iowa
A Subsidiary of Mechanical Handling Systems, Inc.

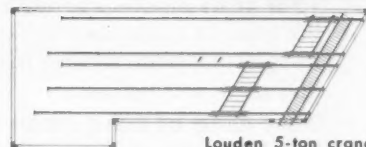
Louden

MONORAIL & CRANES

SINCE 1867... THE FIRST NAME IN MATERIALS HANDLING

... for more details, circle No. 21 on Reader Service Postcard

WESTERN INDUSTRY — October 1956



Louden 5-ton crane operates in diagonal conforming to the angle of rear of building. Unlimited lengthwise and crosswise travel.

Crane and magnet lift 5-ton plate for shape-cutting.

Louden crane transfers 5 tons of angle iron to cutting machine.



New! Louden Shokpruf Electrification for all monorail and crane installations. Hazards of open conductor bars now completely overcome by this exclusive Louden engineering development. Write for full details of this safe conductor system.

MICRO precision switches



...THEIR USE IS A PRINCIPLE OF GOOD DESIGN

CUT COSTS!

Make your plant
more automatic
and
more productive

Send for Catalog #83
for information on MICRO SWITCH
"Industrial Enclosed Switches"



• For years plant operating men have been putting new life into old machines—at low cost—by installing MICRO SWITCH precision switches to make them more automatic and more productive.

They do so by using MICRO SWITCH switches as limits, interlocks and safeties on almost every conceivable type of plant equipment. Special switches are available for use in explosive atmospheres or other hazardous locations. A wide variety of circuit arrangements, actuators and enclosures meets specific operating requirements.

Plant superintendents, electricians and maintenance men have found MICRO SWITCH products invaluable in making present equipment more productive. Full stocks of switches are readily available from authorized distributors who are as close as your telephone. Look under "Switches, Electric" in the Yellow Pages.

ANY OF THESE CATALOGS WILL BE SENT ON REQUEST.

62a • "Basic Switches"	82 • "Basic and Enclosed Switches"
73b • "Toggle Switches"	83a • "Industrial Enclosed Switches"
74b • "V3 Switches"	90a • "Mercury Switches"
75a • "Subminiature Switches"	101b • "Switches for Industry"

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS



HOW SWITCHES HAVE BEEN USED TO SAVE TIME AND MATERIALS

Stops needle breakage:

Switch stops knitting machine when slack develops in wire. Mechanism starts automatically when slack is relieved.

Protects personnel:

Explosion-proof switch installed on filter system permits operation of equipment only if vent valve is closed.

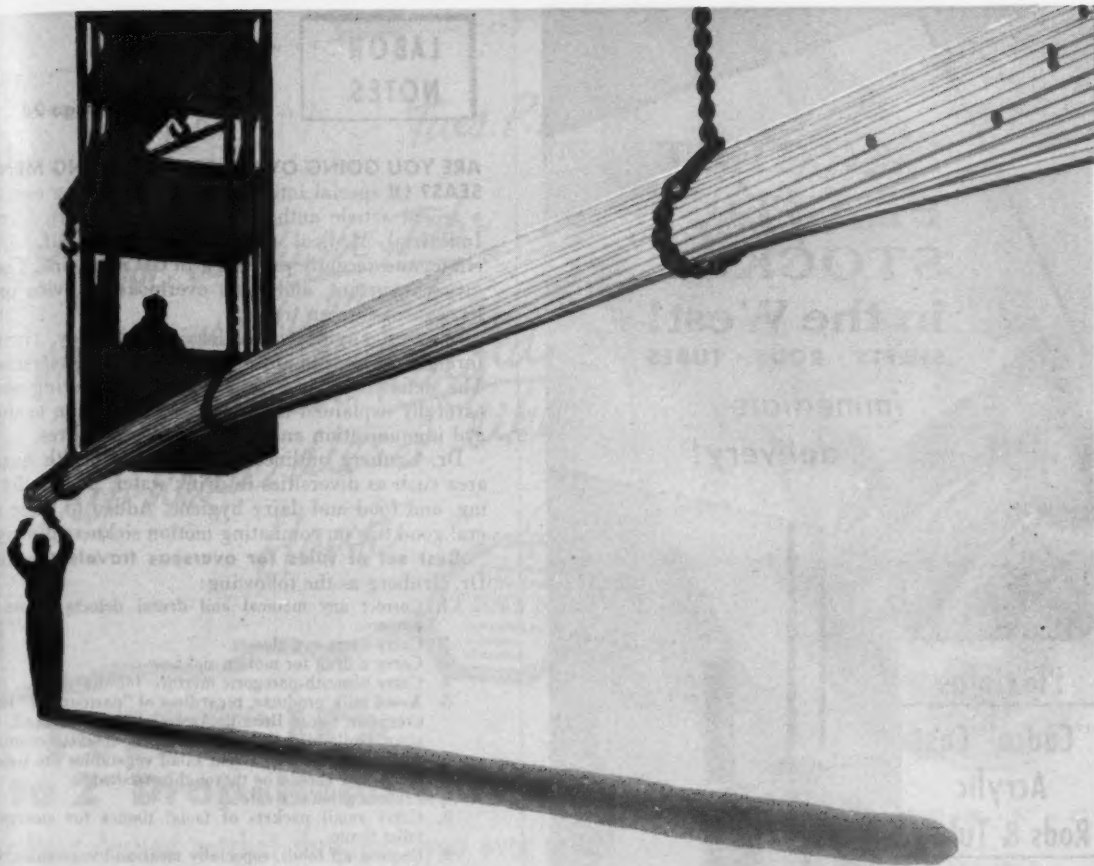
Prevents conveyor pile-up:

Two switches wired in series, each operating independently as sugar bag passes. When bags pile up, both switches are operated and conveyor stops.

Counts revolutions of mixer:

Switch connected with counting device is actuated by each complete revolution of mixing drum, recording number of revolutions at convenient point for operator.

... for more details, circle No. 22 on Reader Service Postcard
WESTERN INDUSTRY — October 1956



*Here is the answer to your needs for **EXTRA LONG***

SEAMLESS STEEL TUBING

Pacific Tube Company can now supply you with precision, cold-drawn Seamless Steel Tubing in absolutely straight lengths up to 58 feet long. Special new equipment, including new pickling tanks 60 feet long makes this feat possible. The longest draw bench in the country helps, too!

For your protection and better tubing, new high-pressure hydrostatic testing is used.

A wide range of sizes is quickly available in many chemistries in Stainless, Seamless Carbon and Alloy Tubing...cold-drawn to your exact specifications.

If you are faced with an application or metallurgical problem, our engineering staff can be of valuable assistance...just let us know your problem.

A complete catalog is in preparation showing sizes, chemistries, bursting tables and other technical data...reserve your copy now.



5710 Smithway St., Los Angeles 22, Cal.

MANUFACTURERS OF SEAMLESS STEEL TUBES • BAR STOCK • GROUND & POLISHED SHAFTING

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LARGEST PLASTIC STOCKS in the West!

SHEETS · RODS · TUBES

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delivery!

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Acrylic
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Please send me the following NEW free booklets:

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| <input type="checkbox"/> Facts about Plexiglas R. | <input type="checkbox"/> Data sheet on CADCO acrylic tubes & rods. |
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LABOR NOTES

... continued from page 24

ARE YOU GOING OVERSEAS OR SENDING MEN OVERSEAS? Of special interest to plant operating executives is a recent article authored by Dr. Kermit H. Gruberg of Industrial Medical Group, Berkeley, Calif., industrial clinic, and recently published in GP magazine. The article gives important, and often overlooked, advice on health hazards of foreign travel.

Western engineers are leaving everyday, traveling to foreign locations to aid in the operation of overseas plants. The deficiencies of public health engineering should be carefully explained to these men in addition to the standard immunization and vaccination procedures.

Dr. Gruberg outlined in his article health hazards by area such as diversities in drink water, poor toilet plumbing, and food and dairy hygiene. Added to these are several good tips on combating motion sickness during travel.

Best set of rules for overseas travelers is listed by Dr. Gruberg as the following:

1. Correct any medical and dental defects before departure.
2. Carry extra eye glasses.
3. Carry a drug for motion sickness.
4. Carry bismuth-pectin mixture for diarrhea.
5. Avoid milk products, regardless of "pasteurized" labels except in Great Britain, Australia, New Zealand, Belgium, Holland, Switzerland and Scandinavian countries.
6. Avoid leafy salads. When salad vegetables are used at home they should be thoroughly washed.
7. Fruit is generally safe.
8. Carry small packets of facial tissues for emergency toilet tissue.
9. Request all foods, especially meat and vegetables, well done.
10. Avoid shell fish.
11. Use iodine water purification tablets or boil all water in suspicious areas.

Two pamphlets are recommended by Dr. Gruberg as guides to good travel advice. "The Health Guide for Travelers," published by *Consumer Reports of Mount Vernon, N. Y.*, at 25c per copy, and "Immunization Information for International Travel," a U. S. Public Health Service booklet available from the Superintendent of Documents, Washington, D. C., at 20c per copy.

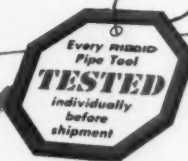
NEW BOOKS TO HELP YOU WITH YOUR LABOR PROBLEMS are the following:

Succeeding with Profit Sharing is a 164-page hard-bound book prepared to help the profit sharing company design an effective communication program, based on facts gathered through research and analysis of profit sharing plans in the U. S. and Canada. There are 18 case studies fully reported in the book. Available for \$4.00 from Profit Sharing Research Foundation, 1718 Sherman Ave., Evanston, Ill.

New Way to Reduce the Cost of Workmen's Compensation Insurance is a 44-page practical "know-how" book in this field just published by Liberty Mutual. Four sections cover in-plant medical programs, industrial hygiene programs, medical advisory service ideas, and a rehabilitation program. In-plant medical section, for example, deals with the treatment of injured workers, pre-placement examinations, follow-up examinations, health counseling and education and the physical and emotional causes of accidents. Liberty will send you the book with no obligation if you'll write them: Liberty Mutual Insurance Co., 175 Berkeley St., Boston 17, Mass., or circle No. 300 on this month's WI Reader Service Postcard (p. 69) for your free copy.

MEMO Tues. P.M.

Joe -
got a Rush Job -
order me full set of
those little Ridgid
drop-head dies & like -
Hank



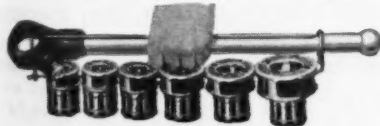
RIDGID

1/8" to 2" Drop-Head Threaders

Handiest darned ratchet threaders you ever used!

Really handy, time savers, easy to use. Pick up the size head you need, snap it into the ratchet ring . . . and start threading! Heads can't fall out. Dies reverse easily for close-to-wall threading. Conduit and special dies available.

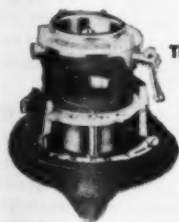
Free carrier with sets. For perfect threads easily and long service, buy 'em at your Supply House.



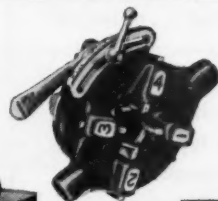
Carrier Free with Sets

Bolt Threaders, too—ask for **RIDGID OOR-B**, same easy-work advantages as drop-head pipe dies.

Whole Line of **RIDGID** Pipe Threaders Offers You Extra-Easy Threading



RIDGID
Jam-proof 6SR
Threads 1" to 2" pipe
with 1 set of dies.



RIDGID
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for power drive use—
threads 1" to 2" with
1 set of dies.



RIDGID
4P Geared Threader
2 1/2" to 4" pipe—
extra-easy handling,
no upkeep.



RIDGID
Top Quality Sulphur-Lard
Thread-Cutting Oil



The Ridgid Tool Company • Elyria, Ohio, U. S. A.

... for more details, circle No. 25 on Reader Service Postcard

Change motors in minutes— with **FALK** all-steel MOTOREDUCERS



OUT COMES OLD MOTOR ↑

IN GOES REPLACEMENT MOTOR →



No long and costly "down time" involved

Motors can be interchanged or replaced *in minutes* with the all-steel, All-Motor type FALK Motoreducer. No long and costly "down time" is involved in making the change!

Best of all, replacement is not limited to original make of motor—new NEMA frames may be substituted for old. This versatile Motoreducer operates with any make, speed or type of standard foot-mounted motor within its AGMA rating. No modification, no special shaft, no "partial" motor required.

In addition to unmatched motor interchangeability, this dependable gear drive—the "work horse of industry"—offers: widest choice of output-shaft position (horizontal, vertical, right-angle)...any output-shaft connection...any mounting, including wall and ceiling...standard speed range from 1.5 rpm to 1430 rpm. All these advantages, plus proved efficiency, low maintenance and extra-long life, make the All-Motor type FALK Motoreducer your best buy for any job requirement.

Furnished in sizes up to 75 hp with any make, style or type of motor; or, without a motor if desired. FALK Motoreducers are available from convenient factory, field or distributor stocks, from coast to coast.

Write for Bulletin 3100

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

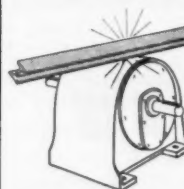
MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
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- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

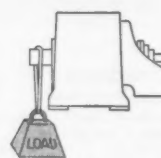
FALK

...a good name in industry

FALK "IN-BUILT" FACTORS assure full dependability— better service—longer life

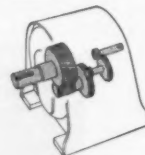


ALL-STEEL HOUSINGS
Rugged, strong, rigid...all parts heavy steel plate, formed and welded in the Falk Weld Shop.



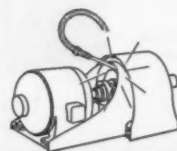
LARGE OVERHUNG LOAD CAPACITY

Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum loads.



PRECISION GEARING

Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion.



SEALED HOUSINGS

Splashproof, dustproof, oiltight. Dual closures and one-way vents keep oil in, dust and moisture out.

... for more details, circle No. 26 on Reader Service Postcard

Shipping to WESTERN CANADA?

HOW TO PREPARE

Your Shipments to Canada

A documentation guide for motor freight
export of merchandise moving from the
United States to Canada
Compiled from official U.S. and Canadian
Customs Publications
Published January 1, 1958

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CONSOLIDATED FREIGHTWAYS

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FREE!

CF export guide saves you time and trouble!

If you ship to Western Canada, you'll want a free copy of Consolidated Freightways' up-to-date booklet on "How to Prepare Your Shipments to Canada". This 12-page brochure is the winner of a 1956 A.T.A. 1st Place Award for motor carrier service literature. CF's fact-packed guide will help you properly document your Canadian shipments. They'll receive fast, trouble-free service and avoid unnecessary delay at the border. Clip the coupon and send for your copy today!

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Please send immediately my free copy of
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... for more details, circle No. 27 on Reader Service Postcard



NORTHWEST INDUSTRIAL SAFETY will be the topic of interest for more than 500 plant operators and other interested persons on Oct. 31 at the Olympic Hotel in Seattle. The gathering will be for the First Annual Puget Sound Industrial Safety Congress and Exhibit sponsored by the Seattle-King County Safety Council in cooperation with the city of Seattle, the American Society of Safety Engineers and Federal Safety Council.

Chairman of the industrial committee of the sponsoring organization, Pat Reiten, stated in announcing the conference that "Every year hundreds of thousands of dollars in lost time, injuries, replacements and industrial insurance go down the drain. This conference can go a long way toward reducing that cost."

Principal speakers at the Congress will include Paul Gurske, director, Bureau of Labor Standards, U. S. Dept. of Labor; Gov. Arthur B. Langlie; Ed Weston, president, Washington State Federation of Labor; J. D. Zellerbach, president, Crown-Zellerbach Corp.; and Mayor Gordon S. Clinton of Seattle.

Registration or queries for further information should be addressed to the Seattle-King County Safety Council at 1014 Third Ave., Seattle, Wash.

MODERN WELDING TECHNIQUES for foundries will be detailed to Western members of the American Foundrymen's Society at several November meetings by an expert on the subject, *Dr. William H. Rice*, welding consultant for Electric Steel Foundry Co., in Portland, Ore. Dr. Rice will travel to Western locations on the following dates: Los Angeles, Nov. 9; San Francisco, Nov. 12; Portland, Nov. 14; Seattle, Nov. 15, and Vancouver, B. C., Nov. 16. His discussion will cover modern welding applications, limitations and techniques.



Dr. William H. Rice

LATEST IN EPOXY RESIN TECHNOLOGY will be offered to process and materials engineers by the Southern California section of the Society of Plastics Engineers at a one-day symposium to be held Nov. 16 at the Institute of Aeronautical Sciences, 7660 West Beverly Blvd., Los

Angeles. Particularly appropriate to Southern California technological needs because of the rapid advancements that have been achieved in the application of epoxy resins in that area, symposium subjects to be covered include "Three epoxy resin systems for elevated temperature use," "The effect of cure cycles on properties," "The chemistry of modifiers for epoxy resins and their effect on properties," "Epoxy resin hardener systems," "High temperature anhydride cures," "High temperature liquid amine hardeners," "Dermatosis and epoxy systems," "Thermal expansion of filled epoxy resins," "Glass fabric finishes," "Epoxy laminates: production problems and techniques," "Epoxy laminates from preimpregnated reinforcements," and "Epoxy adhesives."

Registration—which includes luncheon and a booklet containing symposium papers—is \$5.00. Inquiries and registrations should be addressed to the Society of Plastics Engineers, care of Paul Erskine, 315 E. Washington Blvd., Los Angeles 15.

THE BIG NOISE IN WESTERN PLANTS is about to come one step closer to meeting its Waterloo. A special feature of the Third West Coast Noise Symposium slated to be held at the Institute of Aeronautical Sciences Auditorium in Los Angeles Nov. 12-13 will fire this added shot in industry's battle against noise. Theme for the meet is "Noise in buildings" and papers planned for the session will cover in addition to industrial noise and hearing such other topics as noise control criteria, indoor and outdoor noise sources, design of walls, roofs and windows, noise control techniques for heating and ventilation, plumbing, appliances, and office equipment.

More information can be had from the Third West Coast Noise Symposium, c/o Greater Los Angeles Safety Council, 610 So. Main St., Los Angeles 14, Calif.

WESTERN MEETINGS YOU SHOULD PLAN TO ATTEND

Oct. 16-18—**36th PACIFIC COAST MANAGEMENT CONFERENCE**, Claremont Hotel, Berkeley, Calif. Contact California Personnel Management Assoc., 2180 Milvia St., Berkeley.

Oct. 18-19—**INSTITUTE OF MANAGEMENT SCIENCES**, third annual international meeting, Hotel Statler, Los Angeles. Contact Crosby M. Kelly, publicity chairman, Litton Industries, Inc., 336 N. Foothill Rd., Beverly Hills, Calif.

Oct. 31—**ANNUAL PUGET SOUND INDUSTRIAL SAFETY CONGRESS AND EXHIBIT**, sponsored by Seattle-King County Safety Council, city of Seattle, American Society of Safety Engineers, and Federal Safety Council. Olympic Hotel, Seattle. Contact Seattle-King County Safety Council, 1014 Third Ave., Seattle, Wash.

Oct. 31-Nov. 1—**1956 WESTERN AREA DEVELOPMENT CONFERENCE**, "Resources for Industrial Expansion" theme, co-sponsored by Stanford Research Institute and Confederación de Camaras Industriales de los Estados Unidos Mexicanos (a Mexican industrial association), Hotel Westward Ho, Phoenix, Ariz. Contact Charles L. Hamman, Assistant Director, Economics Research, Stanford Research Institute, Menlo Park, Calif.

Nov. 1-3—**NEW MEXICO MINING ASSOC.**, convention, Carlsbad, N. Mex. Contact J. B. Knaebel, president, P. O. Box 1125, Santa Fe, N. Mex.

... continued on page 34



H. F. Crossno, general superintendent, California Cotton Oil Corp., Los Angeles, California

"UNOBA holds down bearing wear in our delinting machines"



"Union's UNOBA Grease has been the bearing lubricant in our 60 Carver cotton seed delinting machines for the past 17 years.

"I've found that UNOBA stands the speed of these machines better and stays in the bearings better than any other grease. And despite severe conditions of dust, trash and sand UNOBA holds down bearing wear to almost nothing in our delinting machines. Our records also show that UNOBA has saved us a great deal of money over the years by reducing our maintenance and repair costs."

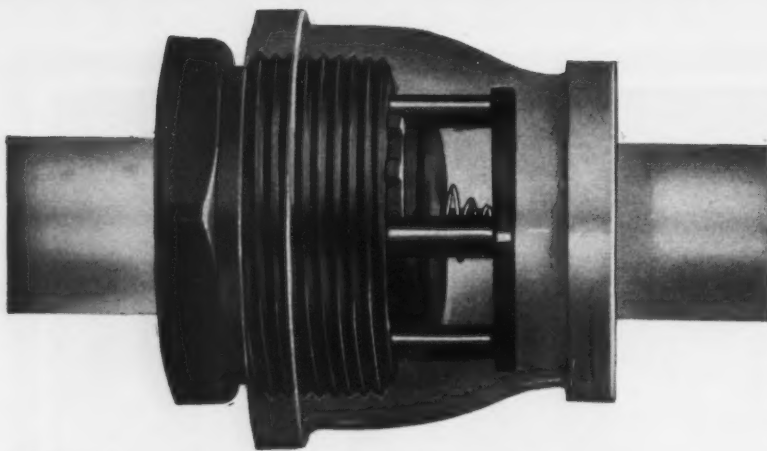
If similar conditions of dust and other abrasive materials exist in your plant we recommend that you do as Mr. Crossno does and protect the bearings in your machines with UNOBA, Union's barium-lithium multi-purpose grease.

UNION OIL COMPANY
OF CALIFORNIA



Los Angeles: Union Oil Bldg. • New York: 45 Rockefeller Plaza • Chicago: 1612 Bankers Bldg. • Philadelphia: Eastwick Ave. & Edgewood St. Dallas: 313 Fidelity Union Life Bldg. • Kansas City, Mo.: 612 W. 47th St. New Orleans: 644 Nat'l Bank of Commerce Bldg. • Boston: 214 Harvard Ave.

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With this check valve and your imagination

you can:

- **Cut inventory—drastically**
- **Reduce costs—substantially**
- **Be ready for any check valve emergency**

By combining a Durabla Basic Check unit with any standard pipe fitting you can make a complete check valve (see right).

These unique check valves, through their interchangeability, reduce inventory sharply. You keep just the basic units on hand, and they're boxed, labeled, and ready for quick installation in any El, Tee, Cross, coupling, tank head or other vessel (such as a "dry can") as each job requires.

Durabla valves cut costs, since all you buy are the working parts. What's more, they operate perfectly in any position.

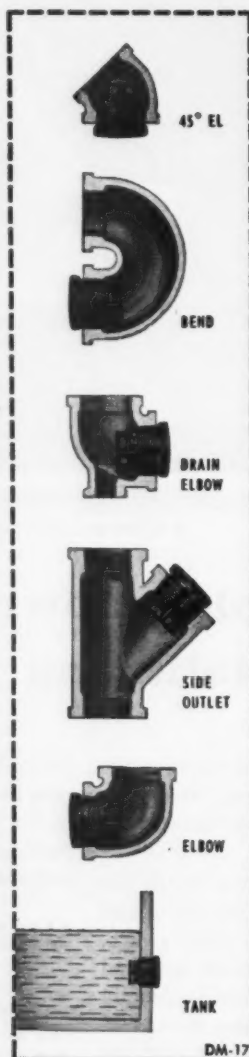
Made of stainless steel throughout, their versatility prepares you for any emergency. Durabla Check Valves will handle any liquid, gas or air—at all temperatures. They come in seven standard line sizes from $\frac{3}{8}$ " to 2". Write for details and bulletin WI106.

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George W. Kennedy Company, Wilmington, Calif.
Warren & Bailey Co., Los Angeles, San Francisco,
San Diego



WESTERN MEETINGS

... continued
from page 32

Nov. 9-10—**AMERICAN IRON & STEEL INSTITUTE**, regional convention, **San Francisco**. Contact Frank Raglan, secretary, 350 Fifth Ave. New York, N.Y.

Nov. 12-13—**THIRD WEST COAST NOISE SYMPOSIUM**, Institute of Aeronautical Sciences Auditorium, 7660 Beverly Blvd., **Los Angeles, Calif.** Contact Greater Los Angeles Safety Council, 610 So. Main St., Los Angeles 14.

Nov. 12-14—**PACIFIC LOGGING CONGRESS**, **San Francisco**. Contact Carwin A. Woolley, 1222 American Bank Bldg., Portland 5, Ore.

Nov. 15-16—**OPERATIONS RESEARCH SOCIETY OF AMERICA**, tenth national meeting, Hotel Mark Hopkins, **San Francisco**. Contact program chairman of the society, U. S. Naval Postgraduate School, Monterey, Calif.

Nov. 16—**SOCIETY OF PLASTICS ENGINEERS**, Southern California section, symposium, Institute of Aeronautical Sciences, 7660 West Beverly Blvd., **Los Angeles**. Contact Paul Erskine, Society of Plastics Engineers, 315 E. Washington Blvd., Los Angeles 15.

Nov. 30-Dec. 1—**NORTHWEST MINING ASSOC. CONFERENCE**, Davenport Hotel, **Spokane, Wash.** Contact Karl Jasper, Radio Central Bldg., Spokane.

1957

Jan. 21-22—**TODAY'S TOOL FOR TOMORROW'S RESEARCH**, symposium sponsored by Assoc. for Applied Solar Energy, Stanford Institute, Arizona State College, and University of Arizona, Hotel Westward Ho, **Phoenix, Ariz.** Contact John I. Yellott, secretary, Assoc. of Applied Solar Energy, 3424 N. Central Ave. Phoenix.

Feb. 7-8—**GOVERNOR'S INDUSTRIAL SAFETY CONFERENCE**, seventh annual California meeting, Biltmore Hotel, **Los Angeles**. Contact Michael Flagg, Department of Industrial Relations, Division of Industrial Safety, 965 Mission St., San Francisco 3, Calif.

Mar. 4-6—**ASSOC. OF IRON & STEEL ENGINEERS**, regional convention, **San Francisco**. Contact J. T. Ess, managing director, 1010 Empire Bldg., Pittsburgh 22, Pa.

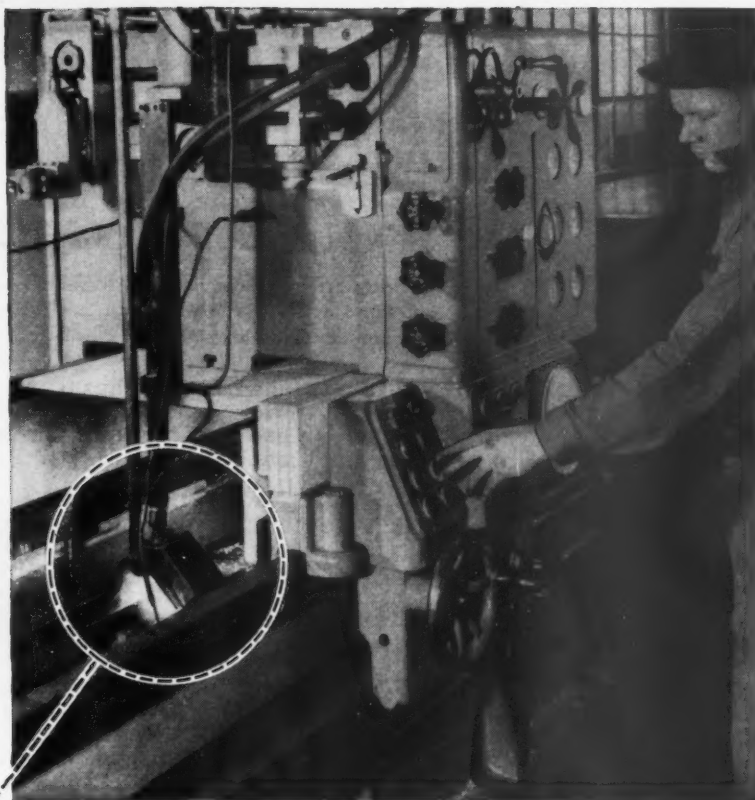
Mar. 18-21—**SOCIETY OF THE PLASTICS INDUSTRY, INC.**, annual national conference, Biltmore Hotel, and Pacific Coast plastics exposition, Shrine Exposition HcII, **Los Angeles, Calif.** Contact society headquarters, 250 Park Ave., New York 17, N. Y.

Mar. 25-29—**AMERICAN SOCIETY FOR METALS**, tenth Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, **Los Angeles**. Contact W. H. Eisenman, managing director, 7301 Euclid Ave., Cleveland 3, Ohio.

May 15-17—**PACIFIC COAST ELECTRICAL ASSOC.**, annual meeting, **San Francisco**.

May 19-24—**NATIONAL FIRE PROTECTION ASSOC.**, annual meeting, **San Francisco**.

HIGH SPEED FLAME- HARDENING



*Cross-section view shows
uniform depth of hardened surface.*

SPECIAL MACHINE UPS LIFE OF GRAPHITIC STEEL PARTS

LINDE engineers have assisted Cincinnati Steel Treating Company in developing a flame hardening machine which increases service life of 16 ft. long, graphitic carbon steel lathe ways . . . Development of this automatic, high speed machine is another example of how LINDE Service Engineers are helping LINDE's customers up production speed and unit quality through co-operative research engineering.

With this new machine, a lathe way to be treated is placed on a magnetic chuck in a water filled channel. Flame-hardening heads and control mechanism move at predetermined speeds along the part. After it cools, the lathe way is placed in a refrigerator for 24 hours which stabilizes the steel, and brings its case hardness to a minimum of 60 Rockwell "C" scale.

The benefits of LINDE's research, engineering, and over 40 years of accumulated know-how stand behind each of its customers to help them solve production problems. Get these "plus-values" which LINDE offers—it pays you to do business with LINDE.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street **UCC** New York 17, N. Y.

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In Canada: LINDE AIR PRODUCTS COMPANY

Division of Union Carbide Canada Limited, Toronto

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.



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... for more details, adv. opp. pg., circle No. 32 on Reader Service Postcard

What's New

IN STEEL FROM STOCK

In the news today are many developments of interest to those who specify, buy or work with steel. Ways in which you can raise efficiency and lower costs in your operations may be suggested by the following summary.

NEW IN RYERSON STOCK—Cold finished Ledloy hexagons in sizes up to 3". (Previous maximum size: 1½"). Welded, square, structural tubing with a lighter wall. Advantages: Costs less yet has all the strength, good surface, etc., needed for ornamental applications.

NEW TYPE 202 STAINLESS NOW AVAILABLE FROM RYERSON—Pioneering with a new type of stainless steel, Ryerson now offers Type 202 sheets, No. 2B and No. 4 finishes in popular gauges and sizes, for quick shipment from stock. Since nickel may continue in short supply for some time, interest in this new stainless has been strong. Reasons: Type 202 contains only half as much nickel as Type 302 yet compares favorably with 302 in corrosion resistance, fabricates as readily as 302 and costs 2¢ per lb. less.

WHAT ABOUT HOT ROLLED BARS? A leading metal-working publication recently listed hot rolled carbon steel bars as a hard-to-get product—but this is not the case when you draw on Ryerson stocks. Our inventories of hot rolled bars have seldom been better, both as to tonnage and size range.

NEW, ACCURATE I.D. ON CYLINDER TUBING FROM STOCK—In hydraulic cylinder applications, the I.D. is the critical tubing dimension. Yet, until now, buyers of tubing from warehouse stocks could specify only O.D. and wall—and wall thickness may vary as much as plus or minus 10% under standard manufacturing tolerances. As a result, I.D. dimensions could vary so widely that tubing was not suitable for cylinder use. But now buyers may specify both O.D. and I.D. when ordering cold drawn seamless tubing from Ryerson (in 2" through 9" O.D. sizes)—thus assuring the accurate I.D. dimensions needed for cylinders. We believe we are the only warehouse to carry this stock.

REPORT ON NEW E-Z-CUT PERFORMANCE—New proof of the quality of Ryerson's leaded plate steel, New E-Z-Cut, was reported by company which recently made a mold for a miniature tire. Some of the tiny lands forming the tread design were only .015" thick but \$30 worth of New E-Z-Cut took the risk out of the \$4000 machining job. Because New E-Z-Cut is remarkably clean and free of excessive stringers, even the finest lands of the mold were sharp and true. Because New E-Z-Cut machines up to 30% faster than mild steel, the difficult job was completed in record time. High finish made the mold easy to prepare for plating.

FLUID LINE TUBING WITH IMPROVED FINISH—Another new Ryerson product is Hydra-Luster hydraulic fluid line tubing which has an unusually beautiful finish, free from scale and surface defects because of a new method of atmospherically controlled annealing. This tubing is on hand in all sizes through ¾" O.D. x 16 gauge wall.

PVC PLASTIC PIPE IN LARGE DIAMETERS—8" and 10" pipe in both schedule 40 and 80 have been added to growing Ryerson stocks of the remarkably anti-corrosive plastic—Ryertex—Omicron polyvinyl chloride. Also available: smaller size of pipe, fittings, sheets and rods. For complete data on properties, resistance to more than 300 chemicals, etc., write for technical booklet 80-3.

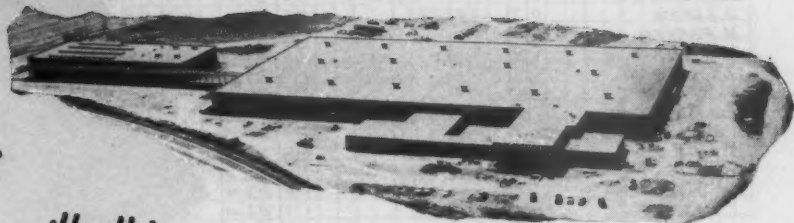
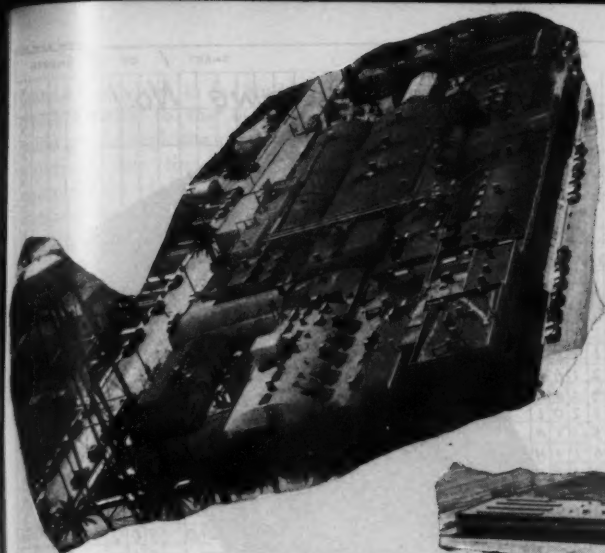


JOSEPH T. RYERSON & SON, INC., LOS ANGELES—Plant: 4310 E. Bandini Blvd. Mail: Box 3817, Los Angeles 54. Phones: ANgelus 2-6141, from San Diego (no toll) Zenith 6660. SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 188, Emeryville, California. Phones: OLYmpic 3-2933, Douglas 2-4211. SEATTLE—Plant: 1200 4th Ave., South. Mail: Box 3525, Seattle 24. Phone: SENECA 2300. SPOKANE—Plant: North 207 Freya St. Mail: Box 2158, Spokane 10. Phone: KEYSTONE 3-1581.

... for more details, circle No. 33 on Reader Service Postcard



October 1956



30 mi. in 3 wks.→

but no production loss with this...

No-loss plant moving plan

Down-to-the-detail advance planning enabled Grayson Controls to move, expand facilities and introduce a new product—all in 3 weeks.

TYPICAL WESTERN PROBLEM
These days is how to move from outgrown facilities into new and expanded quarters—without down-time and serious loss of production. Ford did it in a day two years ago, in occupying its new Milpitas plant. That's one approach. Here's an outstanding example of a different approach—a major plant move over a three-week period, meticulously planned in advance, sequenced, and executed. An actual production increase of 21% during the three weeks of the move, as compared to the previous year's same-period production, is testimonial to the success of the plan. Here's the story of the move, and how and why it worked so well for the Grayson Controls Division of Robertshaw-Fulton Controls Co.

Move planned before plant design

Planning began many months ahead for the switch of production from Grayson's old plant in Lynwood 30 mi. to the new plant in Long Beach, Calif. Master minding this stage, and steps all the way through the moving

project too, was Charles A. Bogenrief, head of Grayson's industrial and plant engineering department.

First step was the design of a master floor plan layout for all of the equipment, machinery and processes—acquired over a 27-yr. period—to be installed in the new two-building plant. So early was this project completed that the engineering firm charged with making the architectural drawings for the new plant utilized the Grayson master layout as a pattern for design of the buildings' facilities.

The master floor plan layout—originated to facilitate a systematic move of the magnitude to be undertaken—consisted of a two-dimensional template type plan. A template was provided to simulate each piece of equipment in the plant on a 1/4-in. to-the-foot scale. The actual layout was assembled on grid type paper in 1/4-in. increments on the same scale.

The two most difficult problems were familiarizing the outside contractors with the operations, processes, and equipment to a sufficient extent that they would be able to detach, move, and re-erect the equipment in

the least possible time, and the challenge to Grayson's own production departments to maintain monthly output schedules.

Among the difficulties involved was the inexperience of Grayson's own staff in making moves of such a large nature. At this point in the transfer of equipment, indications were that new problems would arise as the move progressed, but how many and of what magnitude could only be conjectured.

The plant layout was used in the preliminary stages to familiarize the moving contractors with the extent of the project and it was necessary to work closely with the building contractors some six months in advance of the move. This advance planning became necessary to determine exactly when specific portions of the building would be available to occupy the transferred facilities.

Contractors briefed well ahead

Following these arrangements, it then became essential that the industrial engineering department work in close harmony with the production

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WESTERN INDUSTRY — October 1956

mation was given to the moving contractors prior to the move so they could go through the plant at the old buildings, see the number of the equipment, and get some idea of what facilities were going to be moved to certain areas. Because there were two buildings at the new plant site, one of these log books was made for each building.

Grayson's plant engineering department developed a master plant move schedule and status chart. Each department that was to be moved was listed with a proposed starting time and a proposed completion time, broken down by the various crafts that would actually have a part in the move of any piece of equipment.

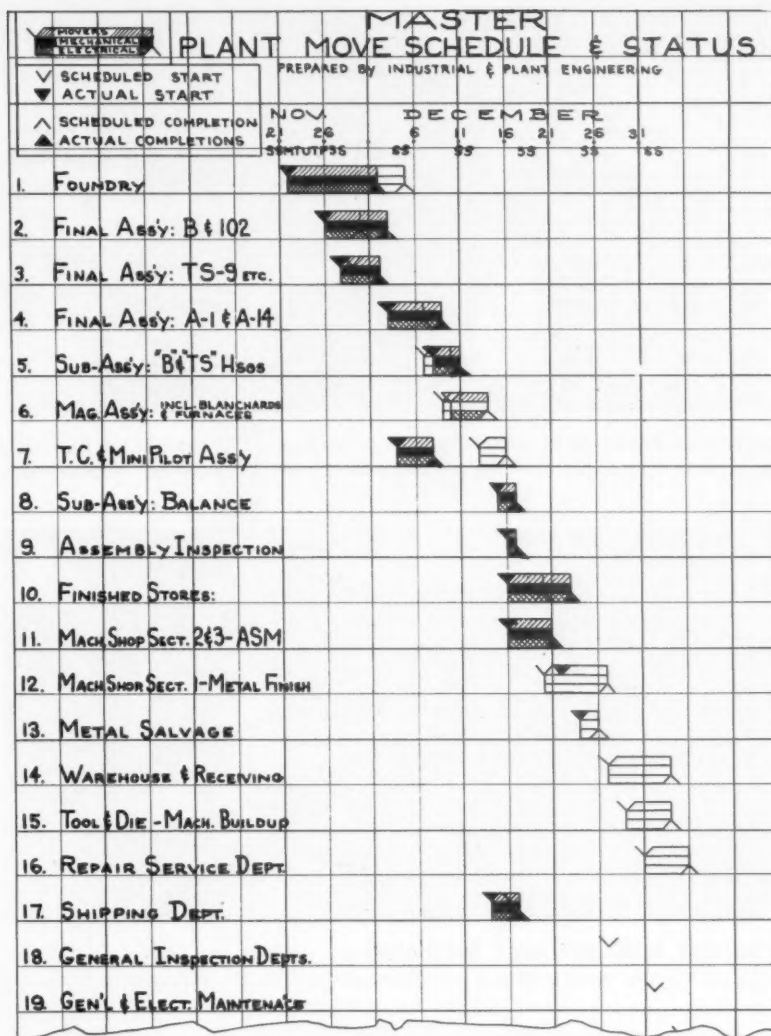
Proof of the planning

These contractors were answering to the plant engineer, each as individual entities. There were plumbing contractors, electrical contractors, rigging and millwright contractors, painting contractors, sheet metal contractors, and miscellaneous other small contractors each working for the plant engineering staff in making the move. The master plant move schedule showed starting dates for each of these crafts on any section that was moved and this was kept up-to-date by the actual progress on the job so that it would be known when to start the next move.

With reference to the Grayson Controls staff assignments and the lines of authority designed to coordinate the move from one plant to the other, Mr. Bogenrief, the plant engineer, was in charge of all moving matters, either with the Grayson staff or with the general contractors. He appointed a representative to be located in the new plant who would subdirect the contractors on moving of equipment into the new location. This plant engineering coordinator was in constant contact with the plant engineer insuring that all questions could be discussed as they arose to assure a smooth operation. The representative in the new plant was given authority to make any necessary changes to facilitate the plant move.

Actual moving of a section with a group of machines and equipment worked somewhat like this: All the equipment in the particular move was tagged with the three-part tag. Contractors making the move would disconnect equipment, with the exception of electrical and plumbing facilities which were the responsibility of the Grayson staff, put it on dollies and wheel it to the trucks.

As soon as equipment was loaded



MASTER TIME TABLE for the three-week, all-out activity was a move schedule and status chart prepared by the Grayson plant engineering department.

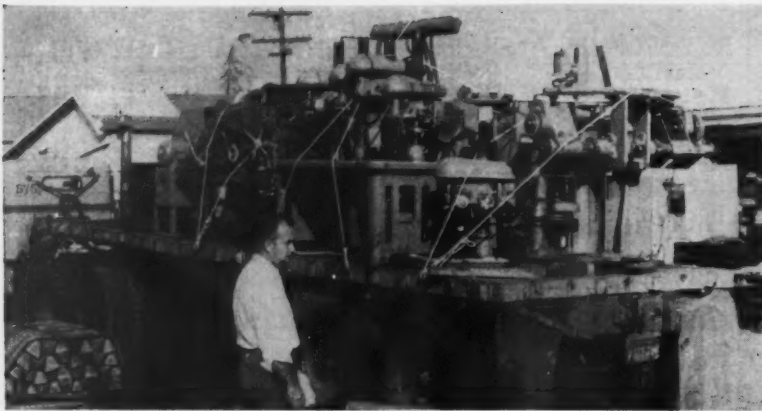
and started for the new job, the tag procedure was followed to insure its safe arrival and bay location in the new plant. In addition to the tag, a master blueprint plant layout of the template type (as discussed earlier) was placed in the new plant to be used by the engineering coordinator, along with the general contractors to assure specific location of equipment on the floor. All layout lines for equipment and markings were made by the contractors and verified by the engineering staff of the company before the piece of equipment was actually placed in position.

An interesting side note on the placing of equipment was the fact that, with few exceptions, no machines or equipment were actually bolted to the concrete floor. In lieu of this, rubber pads, a new type of insulating machine mount, were utilized. There were two or three different types based on the

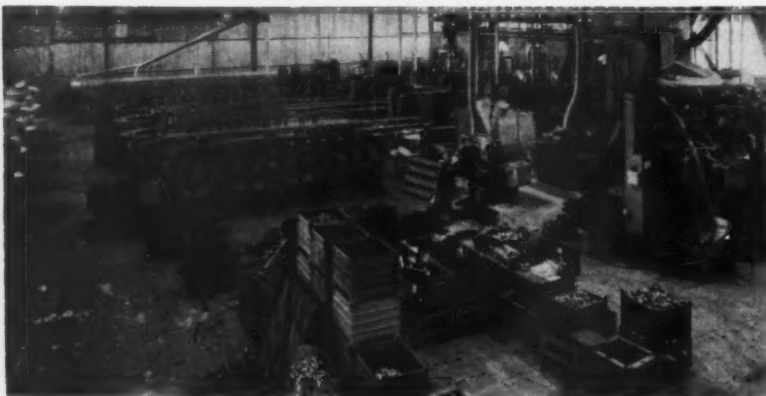
nature of the equipment that was to be placed on the pads. This eliminated drilling holes and running lag screws and sleeves and saved a considerable amount of time in placing of machines. It also excluded the necessity for accurate leveling of each piece of equipment.

Foremen check move-in details

To assure the production department and the operating foreman's responsibility when a particular section of the plant was going to be moved, the foreman normally in charge of that section was placed at the new plant site to work with the engineering staff so that he could personally check all items, arrangements, equipment and details to assure himself that his line would be ready to produce parts in the shortest possible time. This was helpful in several ways; namely,



NO-LOSS MOVE GETS UNDERWAY for Grayson after months of planning and scheduling by the industrial and plant engineering department.



FOUNDRY CAPACITY WAS INCREASED by adding conveyors, walkways and additional work stations simultaneously with the equipment transfer.



BACK IN OPERATION, the Grayson Controls machine shop in its new Long Beach plant location is symbol of effective and early planning.

the foreman of that section was actually a part of the plant move; he had definite responsibilities and couldn't say that he had nothing to do with the move. He actually helped on the job by assuring the company and himself that all items were present and ac-

counted for to make his section complete and ready for production.

The Grayson Controls employees were limited by general contractors as to the type of work or participation in the move. These employees, not utilized, were temporarily laid off due

to closing down of their departments. However, they were able to utilize the services of most of the men in these departments in performing a limited type of labor such as clean-up, placement of parts at work stations, and small items of similar category.

The schedule for moving a section of approximately 50 to 100 employees and their respective work stations and equipment was three days from the time that the line was broken loose until it was to be in production in the new plant. Some of this time was practically around-the-clock effort, depending upon the nature of the items to be moved.

Prior to moving, there was some question as to the most economical way to contract this work. One proposal was to have each contractor involved come into the plant to be vacated and give a firm bid on what he estimated the move would cost. The second method was designed to work on a time and material basis with each contractor, designed so that, if the contractor did not meet expected satisfaction standards, Grayson Controls could discharge the contractor and hire a replacement.

Avoiding estimated-cost padding

As a first step in this direction, the company had estimates made by the contractors; a maximum figure was developed and used as a budget to determine what the move would ultimately cost. To avoid having estimates padded by contractors so that they would be assured of complete coverage for all eventualities, it was decided that in the best interests of Grayson Controls and the contractors, the work would be performed on a time and material basis. At any point in the transfer of operations, dissatisfaction on the part of the company could lead to discharging of the contractor. This method proved very satisfactory in most cases. However, there were the usual problems of keeping contractors busy and preventing them from stretching the work where they saw the job was coming to an early end.

One other eventuality which was not originally figured in the move, but subsequently took place, was the introduction of a new product that was to be in production at about the same time the plant move was scheduled. Due to the lack of space in the old location, there was an unfortunate delay in installation of the line to produce the new device. Therefore, it became necessary to provide the facilities and begin production at the same time transfer of equipment was taking place.

Die handling costs trimmed

... by a team-up of lift trucks and two-way radio in delivering dies from 5-acre storage area to forging works at Douglas.

A SYSTEM INVOLVING five radio-dispatch lift trucks has enabled Douglas Aircraft to speed up delivery of dies to its drop hammer department and consequently boost production at its El Segundo, Calif., plant.

Previously a major problem—and a time-eater that left operators in the drop hammer department idle while a change in dies was made—dies at Douglas constitute a "farm" of 6,000 weighing as much as 39,000 lb. each. They are stored in a five-acre area, part indoors and part outside. The outdoor area, where most of the dies are stored, is 40 ft. wide and 2,000 ft. long. Each set of dies is catalogued, marked and assigned a definite storage location.

The previous method of die handling was, as well as time consuming, hazardous to workers and equipment. Die sets, when needed in the hammer department, were



DISPATCHED TO "DIE FARM" by two-way radio, trucks pick up dies and deliver them to drop hammers, eliminating need for crane, trailer and hoist.

Depending upon the type of die, the operation is performed in one of several ways. Some dies are handled using a yoke and chain attachment with the fork truck. After the yoke has been placed over the forks and swung into position, metal dowels attached to the yoke are slipped into holes which have been sunk into the dies. The forks are elevated lifting the die out of storage and the truck delivers it to the hammer.

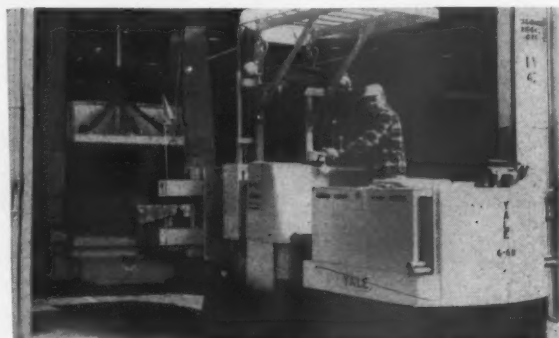
Other dies are handled by inserting the forks of the truck directly into channels which have been built into the base of the die. A third method is by hydraulically squeezing the forks together so that the inside edges of the forks fit into grooves that have been cut in the outside edges of the female die.



NO NEED FOR HOISTING as 18,000-lb. capacity Yale electric fork truck rolls into drop hammer department to lift die up and into a Cecostamp.

loaded on trailers by a crane, towed to a hammer and placed in position by an overhead hoist. Die removal involved the same equipment. Danger of the dies dropping during either of the hoisting actions was high.

Helping Douglas solve its die handling is a team of five Yale trucks, including a 25,000-lb. capacity fork truck, three 18,000-lb. capacity electric fork trucks and a 10,000-lb. gas fork truck. All are equipped with hydraulically adjustable forks. When crews at the hammer house complete a production run on a part and need dies to start a new job, the identification number of the die is phoned to a central dispatch station which is in two-way radio contact with lift trucks. The dispatcher sends one fork truck to the forge to remove the old die and return it to its location in storage. A second truck is dispatched immediately to select the needed die from storage and carry it to the drop hammer department.



RETURNING DIE TO STORAGE is routine job for fork truck, which runs fork into forge to pick it up, while another truck is on the way with different die.

Any-position precision drilling

... is possible with this portable electro-magnetic drill press. It's saving money for Western plants and has spawned two other magnetic work positioners for production and maintenance work. Here's how.

HAVE YOU EVER WATCHED a worker fumble with an oversized, or a very small, or an odd-shaped piece of metal while trying to drill or weld it? . . . or tear down a unit to move one part to a drill press for modification or repair? These are time consuming tasks, often injurious.

Now, many Western plant operators are putting new "magnetic force" tools to work to take the headaches out of jobs like these. The case histories on these pages show how they're doing it, and how the new tools are saving time and money.

Pioneering these new methods of work positioning is a Western firm, Buck Manufacturing Co. of Los Gatos, Calif. As increasing numbers of plants turn to the magnetic tools to meet "toughy" maintenance and production problems, the firm is planning production in a new and larger plant to meet the increasing demand.

Called "Bux" magnetic products, the firm's line of electro-magnetic vise and positioning tools presently includes a portable electric-magnetic drill press, an electro-magnetic drill vise, and a portable electro-magnetic plate clamp. The drill press consists of an electro-magnetic head on which is mounted a fixture that can be adapted to any standard drill unit. A rack and pinion are provided for even and controlled drill point pressure. Available in four basic models, the largest unit provides a maximum of 2,700 lb. of magnetic pull and a top drill point pressure of 1,850 lb.,

while the smallest unit has a magnetic pull of 1,200 lb. and a drill point pressure of 550 lb. Either electric or air-powered drills can be mounted on the presses.

The drill vise is a circular electro-magnetic head 8 $\frac{3}{4}$ in. in diameter, suitable for holding small or even irregularly shaped parts during drilling; or for fixing positions exactly for pieces to be drilled on a production basis; holding fixtures in place for drilling without clamps, bolts or chucks; holding V blocks in place for drilling round stock; holding fabricated parts in position for assembling; and positioning edge-drilling. A three-way switch permits the operator to de-magnetize the work piece for easy removal and clearing of chips. Removal and replacement of the work piece can be accomplished without danger of changing position of locating arms.

Savings of up to 50 min. per 30-ft. weld have been obtained by users of the Bux electro-magnetic plate clamp. Weighing 80 lb., this unit is designed to hold ferrous-metal plate in position for butt or lap welding. Misalignment problems are eliminated as the welder places the plate clamp on the seam between plates and tacks on either side of the clamp while the plate clamp's 6,500-lb. magnetic pull holds them firmly together. (Smaller 50-lb. unit provides 3,000-lb. magnetic pull.) This procedure is repeated the length of the seam and the subsequent complete weld is a simple matter.



Boon to aircraft jig, fixture and plant maintenance work

Many aircraft frame manufacturers and subcontractors have put the Bux drill press to particularly effective use in drilling locating holes on aircraft jigs and other airframe production drilling jobs. At North American Aviation (left) in Los Angeles, a Thor drill teams up with the drill press to do such precision work.

Aircraft plants and subcontractors also use the units for reaming and tapping operations in jig, fixture and plant maintenance departments.

Use of steel pads on jigs and fixtures permits operators to use the drill press for precision work on non-ferrous as well as ferrous metals.

In addition to saving time and money for aircraft plants on tooling jobs such as this, the electro-magnetic drill presses are kept busy with production and maintenance work.

Copper drilling time cut 50%; steel plate for grab-ability

An estimated 50% time savings has been obtained by Kaiser Steel's fabricating division at Napa, Calif., in the machine shop job of drilling copper sections on a pipe welding machine.

In order to adapt the electro-magnetic drill press, a Bux model L-2, for use on a non-ferrous metal, the operator (right) has clamped a steel plate in place, forming a simple fixture. Drill used with the Bux unit in this case is a Skil.

Several Bux magnetic drill press units are used at Kaiser's Napa plant for work in both machine and structural shop operations.

This model drill press has a drill point pressure rating of 1,200 lb. and its magnetic field, operating from 115-v., 70-w. power, provides a direct lift-off strength of 1,700 lb.



Small shear blades drilled safer; no special fixture used

Drilling holes in a shear blade is a much safer job at California Saw Works, pioneer San Francisco manufacturer of cutting blades for lumber, paper and food processing industries, with the Bux electro-magnetic drill vise. At left, operator keeps fingers out of the way while drilling holes in a tapered shear blank.

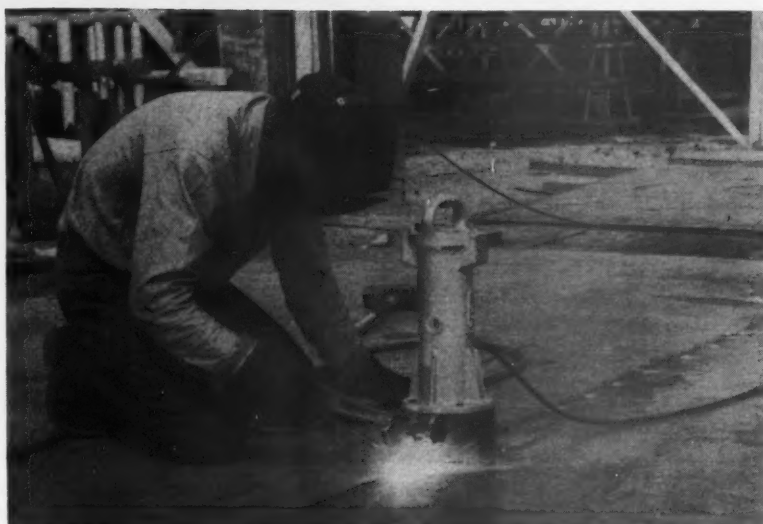
Often small quantity, but production run drilling of small parts does not warrant the construction of a special fixture to hold the pieces, but safety dictates the expenditure.

Note Bux rectifier housing in background. It may be permanently mounted or, as shown here, used as a portable unit.

Steel plate welding savings: 35 to 50 min. per 30-ft. weld

Holding 8 x 30-ft. sheets of 1/4-in. steel plate in position to prevent misalignment during welding is a typical application of the Bux electro-magnetic plate clamp. Shown here in use on an 8 x 30-ft. tank shell job, the unit is estimated by its user, McCarthy Tank & Steel Co., in Bakersfield, Calif., to save 35 to 50 min. per 30-ft. weld. These savings can mean the difference between profit and loss in this type of fabrication.

Welder puts the plate clamp over the weld seam, turns on the power, and tacks on either side of the unit. Repeating this operation the full length of the seam, he is assured of producing perfect alignment in his finish weld.



How engineered color and department coding pay off

... it proven at California Spring's new L. A. plant, where 17 departments are coded by unusual pastel shades. Morale and efficiency shoot up.

STEP FOOT INSIDE the new plant of California Spring Co. in Los Angeles, talk to the plant's operating managers and a few of the workers, and you'll learn in a hurry what smartly-done color engineering accomplished there—and what it can do in your plant.

No doubt about it, here is a plant that proves color engineering is playing an increasingly important role in the unending search for better methods of lowering operating costs and increasing profits.

Most management experts have long agreed that it is almost impossible for industrial workers to operate at peak efficiency for hours at a time

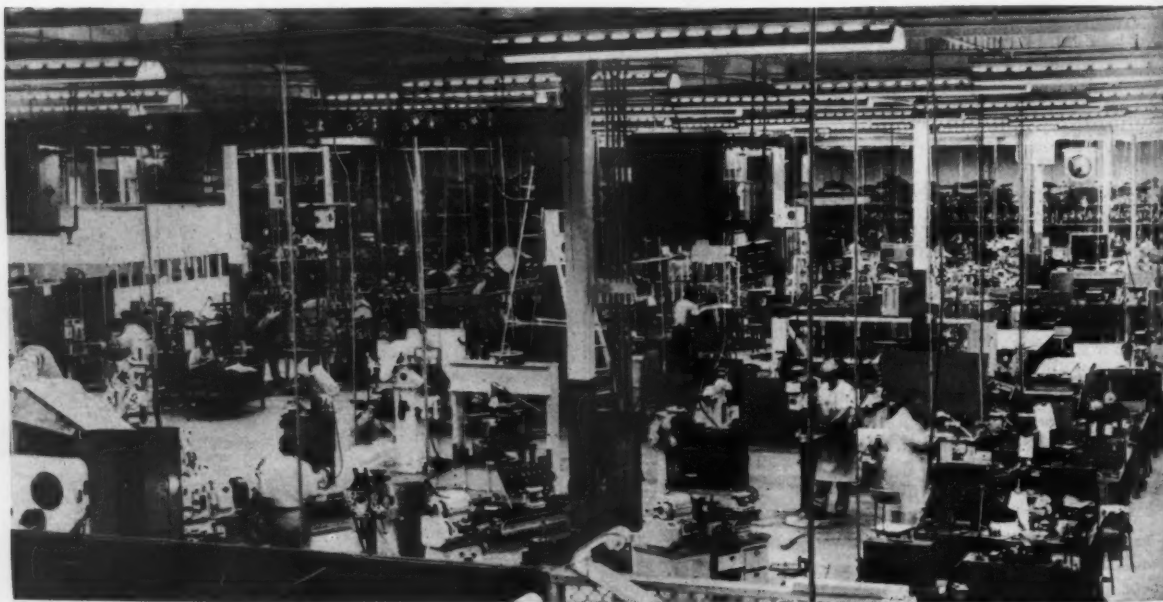
in areas devoid of color. Yet, it was not until recently that functional color engineering in industry has succeeded in breaking down the stigmas of femininity and expense that have barred its widespread acceptance.

Cal. Spring, the West's largest spring manufacturer, not only showed how a progressive industrial firm can utilize sound, conservative color engineering when it went about building its new \$1,500,000 plant, but also broke a few "rules" in its choice of colors—to nobody's regret.

At the earliest blueprint stage, Cal. Spring President Art Vienna called on the W. P. Fuller Co.'s paint color consultant service for advice. Specifically,

Vienna wanted color engineering that would increase efficiency and production, and create an overall atmosphere of cheerfulness. He laid down only two major requirements: first, he wanted to have his 17 different departments departmentalized by color-identification; second, he wanted color engineering to be a tool that would reduce maintenance costs.

Margo Graham, a Fuller color consultant, was called in to advise on how best to do the job. To begin the planning, these things were already known about industrial color engineering: In monotonous grays, the floors, wall, ceilings, and machinery of a plant blend into one dull, drab, cheerless



IF THIS PICTURE WERE IN FULL COLOR (we wish it could be!), you would be able to identify quickly the color-coded individual departments, equipment, and machinery in this overall view of spring manufacturing area.

area, where strained eyes and tired bodies invite accidents and where dark surfaces waste light through absorption. Morale is bound to be low, causing absenteeism and dissatisfied employees. In bright, cheerful, vision-aiding color, the same section of a plant becomes a warm, friendly place to work. With visibility at its peak and light used thriftily, productivity is high, morale is excellent, accidents are rare, and interested, stimulated employees present no problems to management.

The departmentalization problem was the first consideration. At Cal. Spring's old plant, each of the 17 departments was separately housed. In the new plant the departments are all situated in one overall area, with a minimum of partitioning. Fuller recommended painting equipment and machine tools in each department a distinct yet compatible tone, for quick departmental identification. This led to a problem of color selection.

Conventional colors ignored

In conventional industrial plants, equipment and machinery are painted in dark colors for maintenance purposes. Theoretically, the darker a machine is painted the easier it is to keep clean. Vienna, however, expressed his desire to depart from standard practice if it would benefit his program to use lighter, near-pastel shades. With this cooperation from management it was therefore possible for the consultant to not only establish a precedent, but prove the fact that with lighter, more attractive colors, employees would take greater pride in their work and equipment. Because there were not enough standard pastel shades to color all departments, Fuller developed new custom shades specifically for the Calif. Spring project.

To facilitate moving the equipment, all machinery was painted while still in use at the old plant. The results were immediate and obvious. Company executives noted a striking improvement in employee housekeeping habits. Machine operators not only took added pride in their equipment, but they also considered the attractive machinery a compliment to their own importance. Housekeeping improved so graphically that it has eliminated the need for anything more than a skeleton maintenance crew. Cal. Spring officials estimate that maintenance savings in the new plant will be substantial.

Company officials also believe that the renewed pride of shop employees



PASTEL-COLORED MACHINERY? That's right—conventional dark colors, supposedly necessary for good maintenance, have been eliminated. House-keeping has improved so much that only skeleton maintenance is required.

will be reflected in increased production quality. With working parts painted in different tones from the rest of the machine, and dangerous cutting edges painted in bright colors, accidents are expected to diminish in the new plant.

The office area also came in for consideration. All furniture, typewriters and desks are color-coordinated for maximum compatibility. In the reception area, color tones were selected for utmost comfort to make visitors feel at home.

Functional coloring teams with a number of other plant features that qualify the new facility as one of the most modern manufacturing installations in the country. Here is a quick review of other efficiency-booster features:

Overhead handling equipment delivers material from the warehouse directly to any department (with the expectation that this will reduce materials handling costs by some 60%). Plug-in "Bustribution" with tap-off

provisions provides 100% coverage of the production area. Forced radiation heating, and circulating oil for controlled heat insure proper working atmosphere.

Tailor-made lighting

Provision has been made in advance for 30% expansion in each department. Provision has also been made for the construction of a second floor when needed, to further increase production area by some 50%.

Lighting is tailor-made for the plant, with each room and office separately illuminated to satisfy individual requirements. An example of lighting effectiveness is provided in the plant's conference room, pictured on this page.

Constructed of steel and concrete, the plant features a California-tropical motif in its exterior design, with landscaped terraces and California colored stonework emphasizing its unique California character.

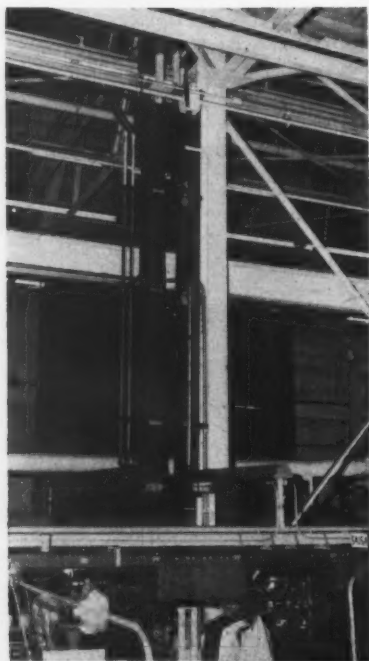


DOUBLE-LEVEL LIGHTING in the conference room, with special Holophane "Beauty Lens" filtering out distasteful yellows, is example of tailor-made lighting throughout plant. Counsel on lighting provided by So. Calif. Edison.



Electricity, air and water are neatly and conveniently delivered to each of Douglas Aircraft's many machine tools by this . . .

Versatile power distribution system



INCOMING POWER DUCTS almost blend "out-of-sight" with building upright, adding to shop neatness and appearance factor. Main power lines are at ceiling level.

POWER, AIR AND WATER lines serving hundreds of machines in the huge 150 x 700-ft. machine shop at Douglas Aircraft's Torrance, Calif., plant are neatly arranged to eliminate all overhead clutter, and to make it extremely convenient to disconnect or re-connect a machine to these power sources whenever it becomes necessary.

Floor-mounted duct support

Three tubular bus conductors carry the 440-v. power in a 4 x 8½-in. power duct running the length of the machine shop between each of two rows of machines. This power duct is supported 7 ft. above the floor on steel stanchions sunk in the machine shop floor. Stanchion butts are not cemented in place, but are anchored by a hard plastic compound which can be broken out easily when it is necessary to move the stanchion to a new location—when machine shuffles are required—or if power duct support changes are required at different places due to added or diminished load of switch boxes.

Plug-in bus duct switches connect the machines to the power duct. These switch boxes can be plugged in or re-

moved from the power duct without interrupting the current supply. Thus a machine may be moved onto or off a specific line, and connected or disconnected, without interfering with the other machines. This has proven to be an extremely important asset, particularly to the ever-changing and advancing aircraft industry.

A 110-v. power line parallels (and is mounted on) the 440-v. power duct in conventional metal conduit. Here again connections may be made at any point. The same stanchion structures support all air and water lines feeding into the shop. Pressure in the air line is maintained at 40 psi. It has been found that 40-psi. air pressure supplies enough air blast to blow chips away from the machines, but not enough air blast to carry these chips into adjacent machine areas. This controlled pressure thus becomes a shop safety factor. All air lines are water-trapped at intervals to catch moisture condensation, thus providing "dry" air for blowing off critical machine surfaces.

Machines are easily uncoupled

Couplings between the machines and these stanchion-supported power supplies are made by short sections of metal conduit for the power lines and short sections of piping for air and water. Only these short connections have to be broken when a machine is moved. The combination switch-and-fuse box for the 440-v. line is usually left attached to the machine side of this short coupling, moved with the machine, then re-plugged into the power duct at the new machine location.



ANGLE ATTACHMENT on this electric powered drill eliminates almost endless task of dismantling obstructions for conventional straight-on drilling.



CONTOUR CUTTING is performed easily at Basic Tool Industries with this combination of Milwaukee Sawzall and a skilled operator.

500 workers; 300 portable tools

High electric powered hand tool-per-worker ratio pays off for Basic Tool Industries, with selection a matter of job-engineering.

CONVENIENCE, VERSATILITY and the fact that they can be taken to the job quickly instead of costly "taking the job to the tool" maneuvers are big reasons why Basic Tool Industries, Inc., uses numerous and varied types of electric powered hand tools in its manufacture of machine tools. But, explains J. B. Hughlett, plant manager at Basic Tool, selection of the hand power tools is a matter of job-engineering, not a hazard, buy 'em as you need 'em situation.

More than 300 small electric powered tools are used in this Southern California plant; the importance of the tools to production is pointed up by the fact that the firm is made up of only 500 employees. A good example of the ability of small tools to handle big jobs is a recent jig boring error that was rectified in the plant. Building a huge fixture for a missile production project involved boring a

large hole in which a hardened bushing insert was to be placed. The job was obviously one for jig boring and it was contracted out to another plant for the necessary work.

Electric drill corrects error

However, when the fixture piece was returned to Basic Tool Industries, operators found that the hole had been bored slightly off center. The error was corrected by building a temporary fixture to mount and steady a Milwaukee heavy duty drill. Once corrected, the hardened insert compensated for the original boring error.

The fact that the tools can be taken to the job, rather than taking the job to the tool, is vitally important in constructing huge tooling fixtures and jigs. Many such structures are literally built up from a foundation (somewhat like a house) and drilling, sawing, filing, and fitting must be performed on

the parts as they are fitted, one to another. It would be next to impossible to perform these numerous small jobs on a distantly located permanent tool. With a small powered hand tool, these jobs can be tackled when and where they occur with the same expediency that a carpenter has in use of his saw and hammer.

Machine tool production varies greatly from mass production operations. Two consecutive jobs are seldom alike. Shop machine tools with specialized permanent fixtures would be practically useless and it is not economically feasible to build a specialized fixture for each of the many jobs involved in completing a complex machine tool.

Tool supplier aids in selection

Electric hand tools fill the gap, but they are only economical if the proper tool or combination of tools are se-



PRODUCTION LINE SET-UP of electric powered tools speeds up output, but it takes the proper assortment to keep men on the job instead of traveling from production line to tool crib. Care in tool selection has paid off.

lected for the job. Basic Tool Industries calls upon its tool supplier, Milwaukee Electric Tool Corp., for advice each time hand power tools are needed. Specifications of the job to be done are outlined by company engineers and the hand tool experts make recommendations as to the tool that will best do the job. Resulting from this carefully planned tool purchasing program is a tooling system that meets the exact requirements of machine tool manufacture.

Tips on effective tool utilization

Next step to economy and production efficiency achieved at Basic Tool Industries is effective utilization of the electric hand tools. Most drilling, sawing, filing, reaming, grinding and polishing jobs are handled with ease, but if a fixture requires close tolerance work a temporary fixture can be erected to hold and handle the small hand tool effectively—and at less cost than the cost of most fixtures for permanent use.

Hand tools in a situation such as

this represent a minimum tool investment and a minimum investment in tool fixtures. Further economy is achieved through topnotch maintenance, although the upkeep factor on the units in use is low. Maintenance work, however, should be done by a skilled tool maintenance technician, and drill bits, saws, etc. used in the tools should be sharpened and reconditioned by equally skilled specialists. Many times an employee who can perform wonders with a hand drill is hard pressed when it comes to sharpening the drill bits that perform the work.

Be sure the tool is large enough

Milwaukee Electric Tool engineers who advise Basic Tool Industries in tool selection recommend that every hand tool used be rated for continuous heavy duty. Tools of lesser power and quality are bound to require more maintenance with resulting loss of initial savings in tool price quickly.

Operator experience is not a requisite on hand power tools to the degree found with machine tools, unless the work is extremely critical. There are no special set-ups to make, adjustments to bother with, or costly fixtures involved that might be ruined by a beginner's lack of know-how. Given a hand drill and a drill template equipped with drill bushings, even a newcomer to shop work can turn out an acceptable piece of work, leaving the more experienced operator free for more critical work.

TO GET LATEST POWER TOOL FACTS

... watch WI's literature and new equipment columns each month.

For example, see item 155 on page 78 this month to obtain info you want about Milwaukee Electric Tool products mentioned in accompanying article ... and item 156 on the same page for details on Bux magnetic products introduced in case histories on pp. 44, 45.

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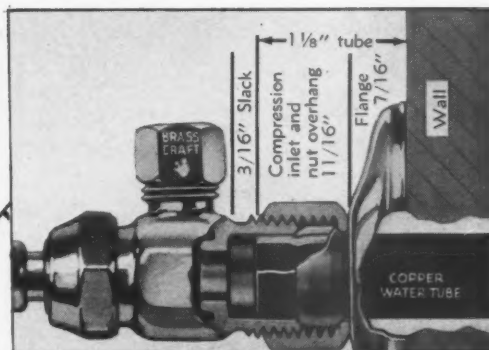
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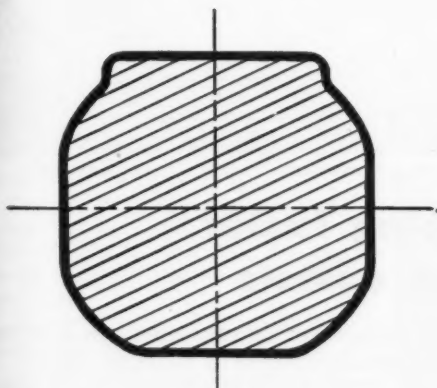
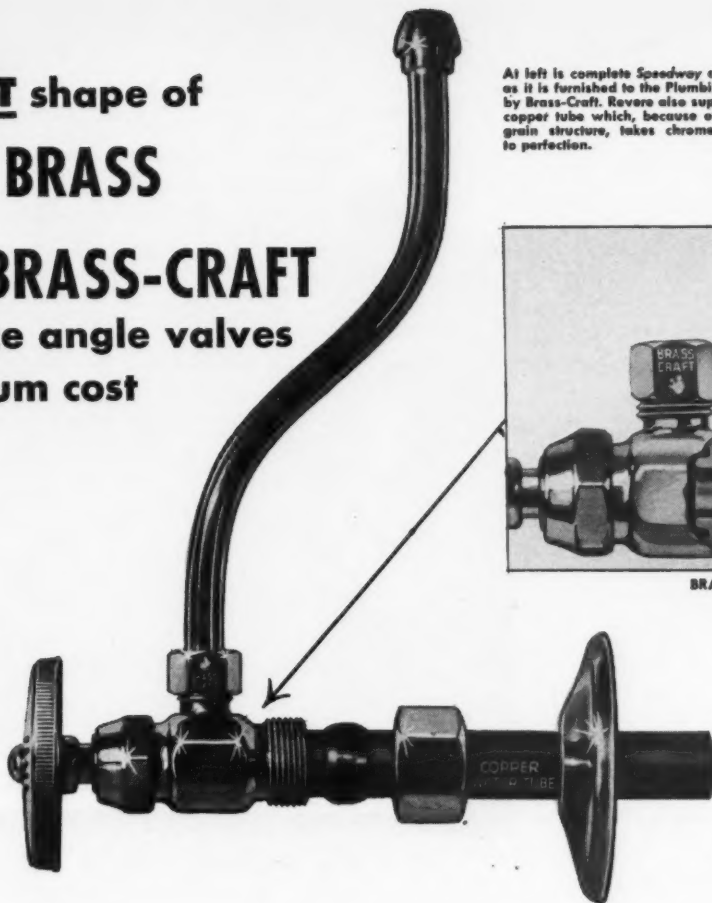
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At left is complete Speedway assembly as it is furnished to the Plumbing Trade by Brass-Craft. Revere also supplies the copper tube which, because of its fine grain structure, takes chrome plating to perfection.



BRASS-CRAFT MFG. CO., DETROIT 1, MICH.



Cross section of Revere Brass Shape used in fabricating angle valves. Corners are rounded for easy buffing, leaving sufficient surface area for wrench pad. Top is made flat for speedy insertion of outlet.

Brass-Craft Manufacturing Company, manufacturers of Speedway Supplies, Valves & Fittings, considered two factors in selecting the Brass Shape of its angle valves.

1. Fabrication from the standpoint of production.
2. Installation and performance of the valve in use.

The shape at the left was found to be "right" from a production standpoint. Brass-Craft preferred it because it was nearest to the finished shape, saving metal, as well as extra cutting and machining. The fine grain structure of Revere Brass makes it especially easy to cut, drill, thread, buff and plate. Its "right" shape permits fabricating the valves into assemblies which save installation time. In this way, Brass-Craft is able to produce a high-quality product at minimum cost.

In addition, these brass valves resist corrosion and are compatible with copper water tube. Thus they have ready acceptance with plumbing and building contractors, as well as home owners.

Once again it is proved that there is one "right" product for every application. A Revere T. A. (Technical Advisor) is available to help you get the one best for you. He is always ready to cooperate in seeking ways to save money and improve your product. Call or write today.



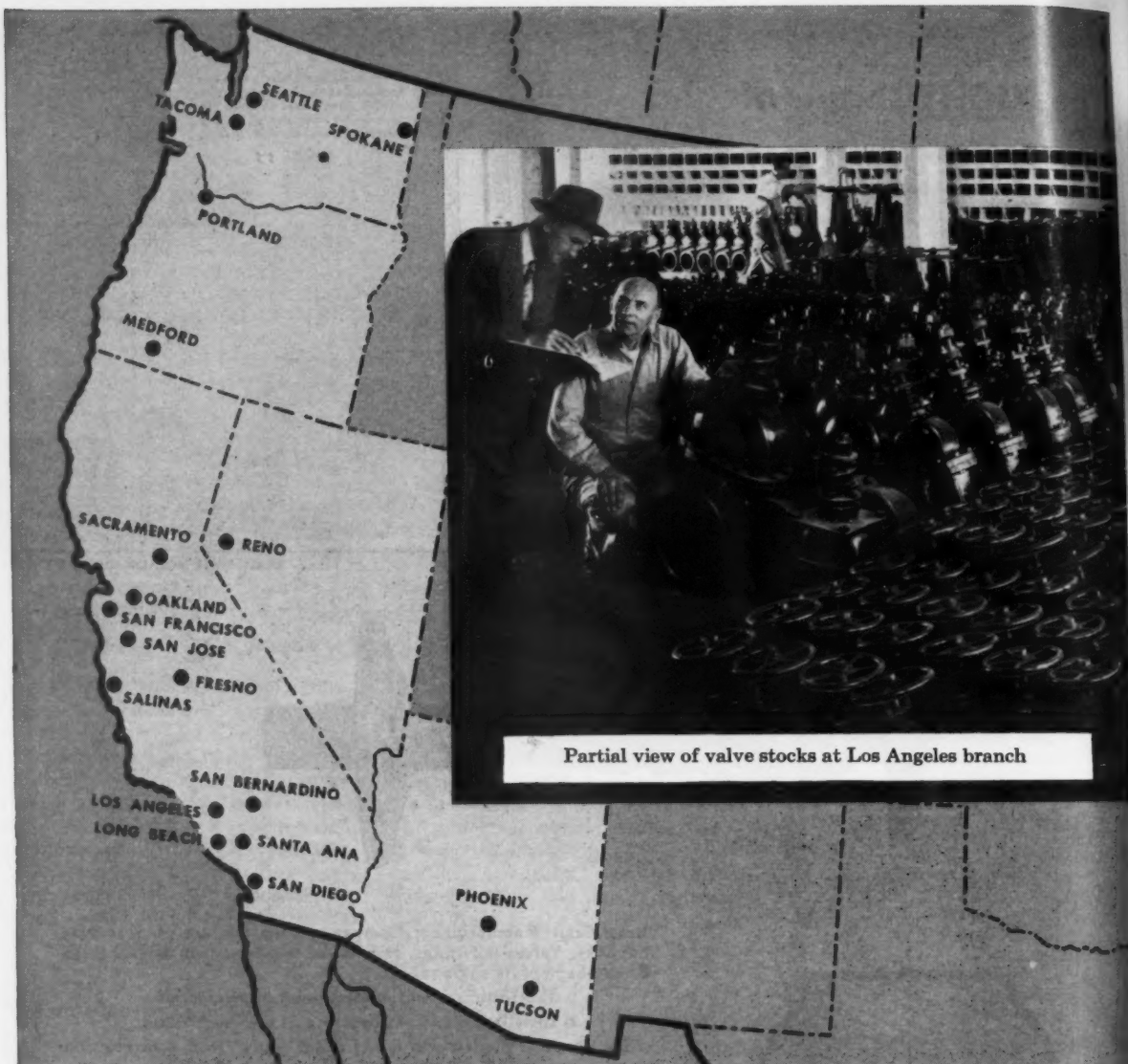
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Partial view of valve stocks at Los Angeles branch

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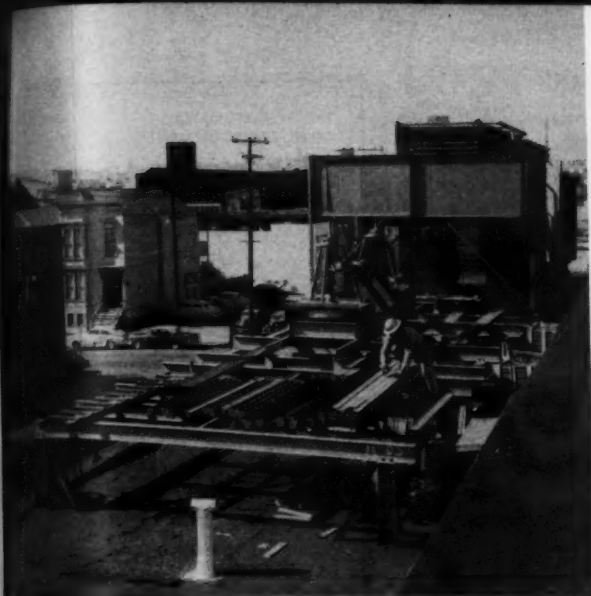
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WESTERN INDUSTRY — October 1956



STEEL SUPPORTS for roof-top cooling units go into place, with Moore Dry Dock crane working from street below.



THE FINISHED JOB—Marley cooling tower, foreground, two Young radiator-fan units in place directly behind.

Dynamometer cooling; a big job

... and it took three cooling units, of two types, to keep air, water and lube oil at correct temperatures for Enterprise Engine's biggest.

THE WEST'S LARGEST hydraulic dynamometer spun under load for the first time a few months ago in San Francisco. A 10,000 hp., 400-rpm. capacity unit, it was built by Enterprise Engine & Machinery Co. to test its new 12 and 16-cylinder RV series diesel engines (see p. 124, Sept. 1956 **WESTERN INDUSTRY**).

Size is the most startling thing about the new "brake." It weighs 90,000 lb.—shaft, rotor, and the two major assemblies that form the casing and stator.

Built at a cost of over \$250,000, the brake features several new features of operation. Most novel is the method for metering water through the mechanism, for the purpose of adjusting the braking effect. In place of the usual complex arrangement of inlet and outlet water valves and pressure regulators, this dynamometer has adjustable weir gates to vary its hydraulic load.

The dynamometer itself is only part of an extensive installation in a pit 76 ft. long and 22 ft. wide. The dynamometer is at the center, for it is intended that an engine for test can be assembled on the foundations at one end while a second engine is being tested on the other end. The pit is at

least 10 ft. deep throughout, plus the sump below the dynamometer trunnions to a depth of 13 ft. 9 in. An intricate piping and pumping system in the pit conveys fuels, cooling water, lube oil, and other utilities to their connecting points.

To meet the two different types of cooling requirements presented by the big dynamometer, and its test stands, two types of cooling systems have been utilized. For dynamometer water and test engine jacket water, the primary need is for thermal capacity—transfer



MAJOR PARTS of West's biggest dynamometer are shown in mid-assembly. Note unusual utilities pit with adjustable "Structor" steel framing supporting maze of utility piping, conduit, and engine instrumentation lines needed.



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THE DYNAMOMETER'S AUXILIARY EQUIPMENT . . .

Engine jacket water system (1,000 gpm.)

4-in. Byron Jackson pump, 50 hp., 1,750 rpm.
Young radiator, with one 30-hp. motor and fan

Lube oil system

De Laval IMO pump, 470 gpm. at 90 psi.
Hoffman full flow filter.

Lube oil cooling water system (600 gpm.)

4-in. Model THM Byron Jackson 50 hp., 3,550 rpm.
Marley cooling tower, (Model 1253-W "Aquatower"), with one 7.5-hp. motor.

Dynamometer water system (800 gpm.)

4-in. Byron Jackson pump, 50 hp., 1,750 rpm.
Young radiator, split-cove, with two 20-hp. motors and fans
6-in. De Zurik three-way control valve, 125 psi.

Scale

20,000-lb., by T. R. Mantes Co.

Structural steel framing for cooling units

Moore Dry Dock Co.

Supports for utility piping and conduit

Adjustable steel "Structor" framing, Kindorf Co.

of heat in quantity. Actual temperature levels are secondary. For intercooler air, however, temperature level becomes important; this is the criterion for a single system which, in series, cools both intercooler air and lube oil from diesel engines on the stand.

The first of these requirements is being met by use of a radiator cooling system; the second, by a cooling tower. The cooling facilities themselves are located on the roof of an adjacent plant bay (see photo), and include a cooling tower for lube oil cooling water flowing at 600 gpm., radiator and fan cooling for test engine jacket water at 1,000 gpm., and radiator and fan cooling for dynamometer water at 800 gpm.

The radiator, or dry-type cooler, does the work simply by fans, transferring accumulated heat from the closed cooling water circuit to the ambient air. The cooling tower, or evaporative cooler, works by evaporation, transferring heat to water. Performance of the two cooler types is dependent, respectively, upon dry-bulb and wet-bulb temperatures.

All three cooling systems of Enterprise test stand No. 22 are specified against an ambient air temperature of 85 deg. F. This is a dry-bulb temperature; the corresponding wet-bulb value is about 60 deg. F.

Working on evaporation, a cooling tower can achieve a low level within 5 deg. of ambient wet-bulb temperature.



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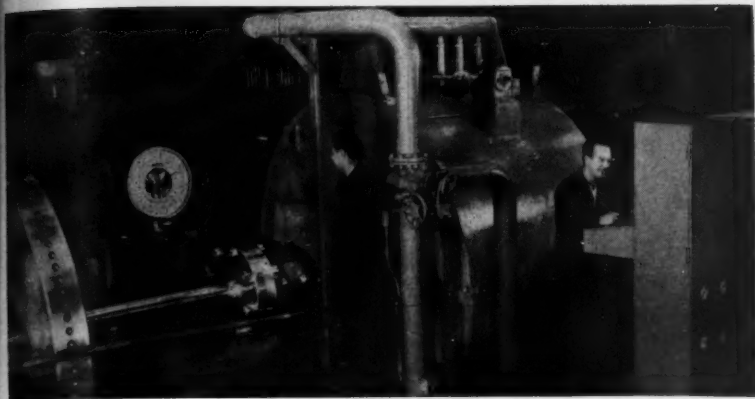
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Lufkin FOUNDRY & MACHINE COMPANY
LUFKIN, TEXAS



WATER FLOW through the dynamometer is regulated by a three-way control valve, but there is little change in scale reading because adjustable sliding gates control water level and braking effect.

ture. This would be about 65 or 70 deg. at Enterprise. Under the same circumstances, a radiator of comparable power requirements is economically limited to about a 30-deg. proximity to the ambient dry-bulb temperature. It will achieve a low level of about 115 deg.

Thermal capacity is criterion

With particular reference to the Enterprise dynamometer and test engine jacket cooling systems, this water does not have to be pulled to low temperature levels. An engine, in particular, will operate better at the highest jacket temperature that can be maintained without danger to the engine at times of sudden loading. Thus, thermal capacity was the criterion, and the radiators—dry-type coolers—were specified. These two units were furnished by Young Radiator Co.

The remaining water circuit has the job of cooling turbo-charged air and lube oil. As between the two, the turbo-charged air cooling requirements were the more rigorous, involving specified temperature levels lower than for any other cooling application.

Test stand No. 22 was designed to accommodate Enterprise RV series engines, built in models having up to 16 cylinders and rated to 7,000 hp. To supply air for these cylinders, four turbo-chargers are required; and for each of these there must be an inter-cooler. (Aftercooling is literally the application, but in the diesel industry such heat exchangers are known as intercoolers.)

Turbochargers are turbine-driven air compressors. Powered by engine exhaust gases, they compress intake air before it is manifolded to the engine cylinders. This action heats the air markedly; further compression in the engine cylinder would raise the tem-

perature to an undesirable level for efficient engine performance. Therefore, the turbocharged air is cooled through intercoolers before manifolding to the engine.

Specification requirements of the Enterprise system included temperatures of 95 and 100 deg. for water entering and leaving the intercoolers. This 5-deg. rise causes a lowering of turbocharged air temperature, depending on the relative volumes of air and water.

To achieve the specified low temperature of 95 deg. at the flow rates involved would have required an unwieldy and uneconomical size radiator. Hence the specification of an evaporative cooling tower, which was supplied by the Marley Co.

Double-duty water set-up

Since passage through the intercoolers raises the cooling water temperature only slightly, the flow of 600 gpm. retains considerable excess thermal capacity. The shell-and-tube lube water thus serves two purposes. Illustrative of the excess capacity is the fact that lube oil cooler temperatures were specified as 130 and 140 deg. for water entering and leaving. This application by itself could have been served by a radiator. But the efficient series operation designed by Enterprise indicates better results.

The Marley tower installed at Enterprise thus meets specification requirements for intercooler service, and provides economical cooling of lube oil.

Moore Dry Dock Co. built structural steel framing for the roof-top cooling units, and used a crane working from the street below to place the units, piece by piece, under the direction of Young and Marley representatives.

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V. J. Fawcett

Lufkin Foundry and Machine Company's home office and plant at Lufkin, Texas, is located in the Southern Timber Belt . . . a beautifully wooded section of East Texas . . . sometimes termed the "Piney Woods" country, where forests of Loblolly and Long Leaf Pine thrive?

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Lufkin Foundry and Machine Company has nothing to do with the restaurant business, but maintains a little hunting club out at Piney Ridge where the cook and his helpers dish out some of the finest Southern Cooking you ever shook a corn pone at . . . m-m-m . . . fried catfish, black eyed peas and turnip greens . . . You all come!

Lufkin Foundry and Machine Company maintains factory sales and service offices throughout the U.S. and serves Canadian oil fields through its subsidiary, Lufkin Machine Company, Ltd., at Edmonton.

V. J. Fawcett

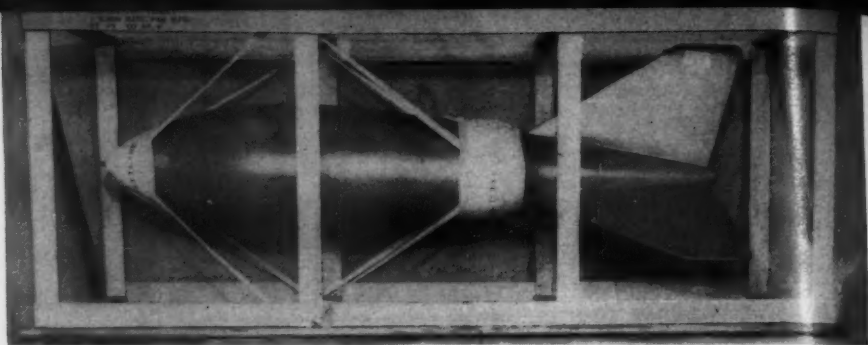
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AWARD-WINNING INDUSTRIAL PACKAGING examples illustrate latest approaches. At left, container and yoking for Model 1 Jet Lube Applicator, product of Jet Lube, Inc., is designed with permanent hinged "door" so applicator can be used in oil fields without removal from package, then closed, shipped, and used again. Designed by SPEC Packaging general manager Breo Freeman, Jr., it won first prize in national SIPHME contest last year. Example of crating for maximum protection at minimum cost and weight is sling mounting for a Lockheed "two target" above, also a SIPHME prize winner. It's time that you determined the answer to the question . . .

Can you use contract packaging?

Here are "what" and "why" facts you need. A leader in the field provides reasons for the fast growth of this special service in the West.

UNTIL RATHER RECENTLY, industrial packaging was regarded by manufacturers as a necessary evil—as something unavoidable that happened to their products after they were carefully manufactured. At the same time, paradoxically, packaging was blamed for all damage incurred after production, and sometimes, even for things that happened during production.

Then the nearly completed transition from a sellers' to a buyers' market, ever-increasing production, and the consequent development of a sharply competitive economy focused attention on product price to such a degree that even the most obscure manufacturing process became the subject of minutely detailed cost analysis. Because of packaging's poor reputation, it was one of the first operations so scrutinized.

The new problems of packaging

The result of this scrutiny is now history. When the manufacturer recognized that a package is no better than its designer, and he was forced to accept the blame for the countless millions of dollars lost through shipping damage, corrosion, mislabeling and consequent higher freight rates, customer ill will, and above all, higher unit product price, packaging engineering progressed enormously.

Today, packaging has become a near science. The development of lightweight materials of high strength, the application of the same type of engineering thought to package design as to the product itself, and rigid quality control procedures bear this out. Packaging engineers are now often consulted during original product planning sessions to insure the product will qualify for maximum protection at minimum cost.

All progress brings new problems, however. Initial expense of designing and installing packaging lines is considerable. Packaging pilot runs of new products, short runs of replacement parts for obsolete items, seasonal or cyclical production, or specialized difficult military or export runs, become costly and unprofitable. Often the manufacturer must accumulate large

stocks of a variety of packaging materials to insure packaging line continuity and this inventory, in addition to being costly, requires warehousing space that could be more profitably used for production. Trained employees in this field are scarce.

Growth of the contract method

Recent experience indicates that the solution to many of these problems lies readily at hand in the contract packaging company. The growth of these companies received considerable impetus during the Korean emergency when manufacturers who were at a loss to interpret complicated military specifications, or who had not the time or trained manpower to do so, turned much of this type of packaging over to these firms.

. . . Turn to page 60

AUTHOR OF THIS ARTICLE



OLIVE SALEMBIER

President
Specification Packaging
Engineering Corp.
Los Angeles, Calif.

Mrs. Salembier, trained at MIT, is one of the few women packaging engineers in the nation and a co-founder of SPEC Packaging. Exemplifying the need for and growth of contract packaging, her firm's business has gone from \$500 per month to \$1,000,000 per year in just four years, and now employs some 100 people. At WI's request, she tells here the "what" and "why" of today's contract packaging.

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Manufacturers with packaging problems, remembering the help received from them during the war, continue to call upon them for assistance. Quite often a smaller manufacturer has found it convenient to turn over all his packaging operations to such a firm. Often the primary motivation for such action was that it permitted plant areas formerly used for packaging operations to be used for expansion of production facilities at a time when such expansion was vital. In other cases it was found to be simply more economical to subcontract packaging.

Economy in subcontracting

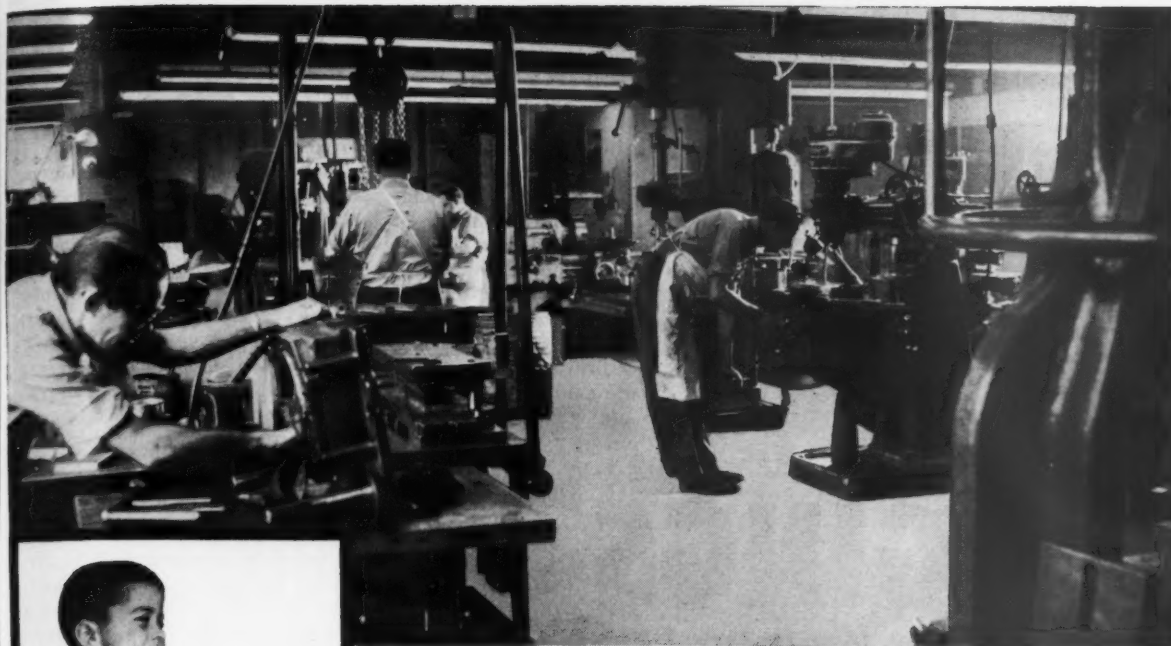
Many manufacturers who are unfamiliar with the operation of the contract packager find the latter statement difficult to understand. Naturally, the type and volume of packaging has an important bearing on the service to be rendered. For example, the small or even medium-sized electronics company often produces either a variety of standard products, or short runs of extremely specialized, complicated equipment on special order. In either case it would be an expensive operation for the firm to divert key personnel periodically to package design, particularly when such persons could not possibly be familiar with all the latest packaging methods, or to set up lines for a multitude of products.

On the other hand, the contract packager is equipped to perform any packaging operation on short notice, buys carload lots of supplies in order to do so (at a considerable saving), takes care of the voluminous amount of paperwork usually associated with shipping, and has the specialized engineering knowledge to produce and test an efficient package at minimum cost.

Compare costs, and benefits

Specialization, efficiency, more knowledgeable utilization of labor forces, experience, and lower overhead tend to keep the contract packager's costs below that of the manufacturer for short run or multiple product packaging. When a manufacturer attempts to compare his packaging costs with those of the specialist, however, he should not fall into the error of using his labor costs alone as a yardstick. Frequently, cost will be equal to, or even higher than, the manufacturer's costs. But he must not forget the tangible and intangible benefits that accompany the packaging service.

These include convenience, elimination of problems and costly mistakes



Keeping up with the ever-changing toy market calls for lots of production ingenuity. Mattel, Inc., the West's largest toymaker, has a flair for developing "impossible" production shortcuts. The first steps in producing a new line of toys takes place in the tool room (main picture). Here Mattel craftsmen fashion press tools for items like the toy cap "Burp Gun" . . . one of the company's biggest sellers. The gun's housing and all working parts are fabricated from USS Drawing Quality sheets.

Fast, accurate metallurgical advice **Helps production run smoothly and on-time**

Because they're located two and three thousand miles from their major markets, Mattel, Inc., of Los Angeles, must depend on originality, quality and production speed to offset the geographical handicap. In their constant race with the calendar, Mattel acts to avoid time-consuming production delays by careful selection of the right steel for each new line of toys . . . and doing this well ahead of time.

Here's where USS Metallurgists help. Fast, accurate advice from this source has been a vital factor in Mattel's production efficiency. To be sure you're using the one right steel . . . add a USS Metallurgist to your production team. This is an easy, cost-free way to increase your production efficiency by avoiding production problems *before they happen*.

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in meeting conditions imposed by outside sources (particularly in military packaging), and elimination of waste. More intangible considerations are the maintenance of a second packaging operation in the event production is disrupted because of catastrophes, strikes, or similar reasons.

How contract packagers work

For those who are unfamiliar with our work, I will outline below what most manufacturers agree are the advantages of contract packaging.

Primarily, the contract packager

has a wide variety of experience packaging everything from pins to electronic brains, gears to aircraft wings, and motion picture props to milling machines. He employs a staff of trained packaging engineers who have an extremely detailed knowledge of package design and function, size and utility, and of the myriad materials and their properties that must be considered in the makeup of any pack. In short, he knows how to achieve maximum product protection at minimum cost.

A packaging firm generally works two shifts and maintains a trained

labor force of persons who have shown unusual aptitude for this peculiar type of work. To keep this force intact he usually pays higher wages than are received by comparable workers employed by manufacturers.

Management, engineers, laborers, and clerical help are all indoctrinated in the almost limitless (to the average person) range of complex government specifications, intricate shipping regulations, and the legal network of rules and laws affecting packaging operations.

In the field of military packaging alone, the contract packager has saved industry countless millions of dollars by his thorough knowledge of military specifications. The lack of uniformity in military specifications, the specialized requirements of the different services, and the complicated legal and technical language used in government documents listing this information that has tripped up many a manufacturer presents no problem to the specialist.

Packaging mistakes can be costly

Because of the high cost of military packaging, a mistake in the interpretation of specifications can mean the difference between a profit and a loss to the manufacturer. Should he mislabel a package, for example, the entire shipment will be returned by the government to his plant for required rework. All paperwork must be called in and revised, and payment held up until the entire extra operation is completed.

Quite often, too, the manufacturer's unfamiliarity with government packaging requirements results in the submission of a bid that is too low with the familiar disastrous results.

The contract packager is also a shipping expert. He has extensive knowledge of the operation and requirements of all carriers, and he knows how to design a package to most efficiently and economically take maximum advantage of the physical size of the carrier to be used and to guard against the stresses and strains peculiar to the various forms of transportation.

Once the packager has picked up the manufacturer's product he assumes complete responsibility for its safety until it is delivered to its ultimate destination. Should damage occur during shipment, the packager completely handles the claim with the carrier and insurance company and promptly makes payment to the producer regardless of the length of litigation that might be involved. Not only does this relieve the manufacturer of such on-

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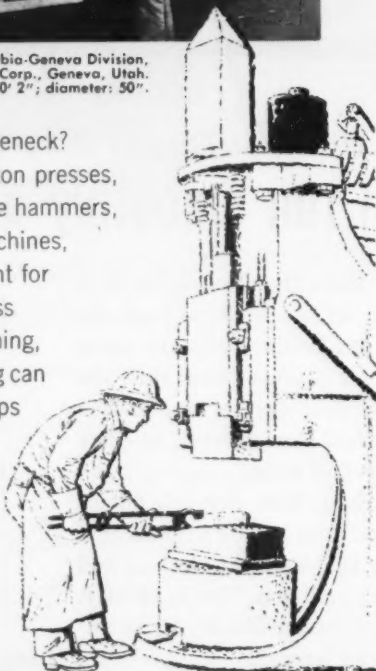


Slab mill eccentric shaft for Columbia-Geneva Division, U.S. Steel Corp., Geneva, Utah. Weight: 42 tons; length: 20' 2"; diameter: 50".

Forging production your bottleneck?

Moore's 1,500 ton and 750 ton presses, 800-6,000 lb. capacity flat die hammers, power hacksaws, burning machines, cranes, and special equipment for sandblasting, annealing, stress relieving, normalizing, quenching, tempering, and tool hardening can speed your production, perhaps improve your product, lower your cost. Let us estimate your next outside job.

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erous chores, but it certainly improves his relationship with customer.

Entire case history of one job

The intricacy of these operations can best be illustrated by describing a typical packaging activity.

SPEC Packaging receives a call from a manufacturer who plans to submit a bid to produce and deliver a gearbox with attached solenoid for the army. SPEC Packaging engineers inspect blueprints and discuss with the manufacturer's representatives such vital information as quantity, methods

of shipment, destination, and eventual disposition. At SPEC Packaging the problem is analyzed, military specifications studied, materials selected, and purchasing and accounting departments consulted. A firm price per unit is decided upon and forwarded to the manufacturer for inclusion in his bid.

When the bid is accepted by the government and manufacture completed, SPEC Packaging trucks pick up the gearboxes and deliver them to receiving. Incoming paperwork is forwarded to accounting where purchase orders and estimates are combined.

The gearboxes are sent to quality control for screening to make certain the estimate matches the purchase order, contract, and government or commercial shipping orders as to packaging and routing instructions and a shopwork order issued.

The work flow pattern

The shopwork order is routed to the pilot pack area whose foreman then obtains the parts from quality control, matches them with the shopwork order, pulls all packaging material to complete the packaging operation through the initial unit pack. This pack will conform to government specification code, Method II-C, which was chosen for the part since it is to be held in storage for a considerable length of time, the solenoid being the critical item in the assembly.

The parts are cleaned by brushing with degreaser, treated to remove fingerprints, and retreated to remove the latter solvent. Preservative is applied, and the part is wrapped in grease-proof paper. Protective cushioning material is wrapped around the unit and placed in a foil-lined scrim moisture and vapor-proof barrier material. A dehydrating agent and moisture indicator card are inserted into the pouch which is then heat sealed, placed in a unit carton which is sealed in turn and the package correctly labeled.

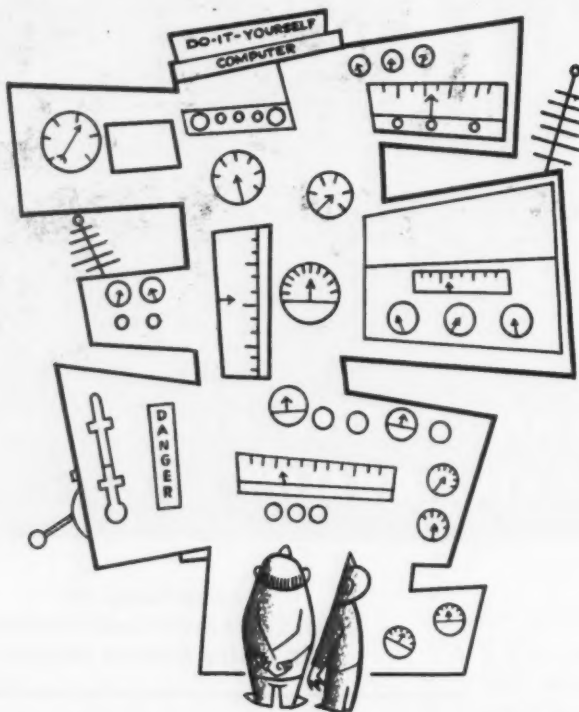
These unit packs then are moved to the intermediate packaging area, placed in standardized cartons, and sent to the exterior packing area, where they are boxed in wooden shipping containers and strapped with steel ribbon. Then they are forwarded to shipping and bills of lading made up.

Each separate operation in the entire work flow pattern is thoroughly inspected by both plant personnel and resident government inspectors.

Becomes another "department"

For many manufacturers, such a procedure is often impossible. Consequently, the contract packager becomes as essential a part of his operation as any one of his standard departments.

The relatively rapid expansion of the contract packaging industry is a direct reflection of manufacturers' acceptance of that service function. Whereas many firms will continue to maintain and perform packaging operations within their own plant, of course, it is certain that more and more companies will take advantage of the facilities offered by the contract packaging companies.



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How to cut cost corners on the cross-country haul

*Modern LCL freight forwarders are helping Western plants
over the East-West barriers to beat inventory and marketing problems.*

SUCCESS AND GROWTH of industry in the West is a tribute to Western know-how and ingenuity, for Western industrialists particularly are forced to calculate transportation costs as a major factor in their profit picture.

A quick look at U. S. census figures shows some of the major reasons why. States west of the Mississippi at present hold only a third of the U. S. population; while the territory east of the Mississippi—only one-third of the U. S. geographically—harbors two-thirds of the population. In addition to the fact that roughly two-thirds of the domestic market for consumer goods and other commodities lies 2,000 to 3,000 mi. away from the West Coast, a preponderance of supply sources are located in the East.

Bucking the inventory problem

In addition to the higher cost of this long supply and marketing line, one more bugaboo plagues Western industry—the inventory problem. Far too often are manufacturers, assembly plants, and distributors faced with this dilemma . . . to incur the expense of carrying unusually high inventories, or to risk not being able to meet production schedules or unexpected buying surges.

As a result of such considerations, many a Western manufacturer is concentrating his promotional and sales efforts in the West and supplying eastern customers only in accordance with desultory demand. While this may seem sound from a competitive price standpoint, nevertheless we cannot close our eyes to the fact that the door is thereby shut to two-thirds of a potential market.

Alert manufacturers who realize this are therefore trying to offset the freight cost with products that by their very nature are unique or superior in certain respects. For example, California has become the world's second largest center of fashions by creating and promoting the idea of casual wear,

as against the mass production of all types of garments in the East.

New and different products, expanded sales forces, and increased promotion are definitely means of combating the advantages of eastern manufacturers.

These are not the only ways, however, nor the ones most applicable in many cases. There is another plan of action that all Western manufacturers can follow—namely, to ameliorate the freight differential and the time factor in the long haul.

How freight forwarders work

The modern freight forwarder can be of great help in this respect. Surprisingly, there are many business men completely unfamiliar with the functions and services performed by the nation-wide freight forwarder who are suffering untold expense needlessly.

This blind spot is understandable because freight forwarding's growth to its present half-billion dollar status is fairly recent. Freight forwarders have been called "wholesalers of transportation services." This in a nutshell is correct, but like most nutshell illustrations, misleading. The freight forwarder is a common carrier operating under government regulation just like the railroads. The forwarder generally owns no rolling stock but utilizes the facilities of many carriers while main-

taining constant control and surveillance.

A freight forwarder works like this: he receives less-than-carload-lots (LCL) of freight from various shippers. He consolidates these cargoes according to destination so that they make up carloads, and he assigns these carloads to the routes giving the best service to that particular destination. At the destination he unloads the freight and delivers the shipments to the respective consignees. Where there are several carriers, or several types of carriers (such as air, rail and plane) required to complete a delivery, the forwarder engages them, but maintains his responsibility all the way. The rate he quotes is maintained regardless of the carriers involved.

By performing these functions, forwarders save shippers infinite amounts of time and money. Consider the elements that must be weighed and the decisions that must be made, if the shipper were to work out *for himself* "the best way" to ship a specific cargo. He must first choose from among railroad freight service, railway express, air freight, air express, parcel post, private trucker, common carrier trucker, contract trucker, rail consolidating agency, or steamship line. Further, he often must decide which of several rail or truck lines most efficiently serves the territory he wishes to reach; he must consider the safety and reliability of the carriers, the prob-

AUTHOR OF THIS ARTICLE



T. R. HUDD

President
National Carloading
Corp.
New York, N. Y.

Thomas Hudd has two strong convictions about the West—that its industrial future is limitless, and that fast, efficient, and economical freight forwarding between East and West will be a major factor in speeding the growth. Because many Western manufacturers are not yet familiar with the new types of freight forwarding services, WI editors asked Mr. Hudd to provide the accompanying facts.

able transit time, and the responsibility of the carrier in case of loss or damage in transit. And he must even weigh the possibility of traffic bottlenecks due to strike or disaster, and the best means of by-passing them.

In addition, he must analyze the transportation cost. This involves the basic rate per 100 lb., the minimum weights or quantities that will yield the lowest cost per unit, the minimum shipping charge (which varies with different modes of transportation), rate or route restrictions, penalty charges, pickup service, terminal or warehouse fees, insurance, special packing requirements, and possible limitations on size and weight per package.

A boon to bookkeeping

Dizzying? The poor shipper has not finished yet! He still has to see to it that the goods are properly described in the transportation papers, since it is often possible to effect savings through the application of specific commodity rates or to downgrade the classification to a lower general commodity freight rate.

These details pertaining to shipping take up many thick volumes which are constantly being amended. Mastery requires years. Is it any wonder that more and more shippers are turning to the modern freight forwarder to unsnarl their knotty transportation problems? Very few shippers, after all, can afford to maintain the huge staff of specialists who are on tap in the forwarder's organization.

The one bill all the way that the forwarder offers is a boon to the bookkeeping department, relieving it of bills from several carriers. In addition, the one responsibility (the forwarder's) enables quick one-call tracing in case the need arises to divert or reconsign a shipment, a feat that is quite difficult if the shipper has engaged several carriers himself.

Speed is another factor favoring the use of a forwarder. When a forwarder is the carrier, the freight rolls fast—the reason being that the forwarder's entire business is centered around LCL freight and carloads are assembled quickly. Since the forwarder is responsible for the freight all the way, speedy pick-up and delivery are an integral part of the service he renders.

Services such as these can ease Western transportation problems. In addition to actual cost savings in dollars and cents, and time savings often amounting to several days, the Western firm using a nation wide forwarder can effect specific overhead

economies in less paperwork, less telephone expense, less time spent in contact and tracing, and less traffic at his loading dock—since the forwarder's truck can replace many vehicles of the several carriers otherwise used for long cross-country hauls.

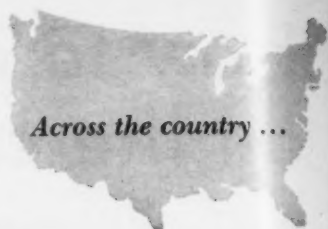
Special help on Western problems

Some forwarders, such as our company, have been developing additional services and programs designed specifically to aid Western business. The transit time of cross-country hauls has been shortened as a result of our careful integration of rail schedules. Direct car service now connects most major points on the Atlantic with major cities in the West, in addition to the expedited movement from the interior states east of the Mississippi to the West.

In addition, the special problems of certain industries have been met. Western assembly plants, for example, often face fluctuating markets, and have to gear their production schedules accordingly. Delayed delivery of parts can mean idle production hours, while premature delivery can clog and clutter production efficiency. We have taken great pains to collaborate closely with assembly plants so that deliveries of parts coincide precisely with production needs.

Western manufacturers desirous of expanding into new markets have found the forwarder's counseling service invaluable. For example, National's network of stations in the U.S.A. and agents throughout the world keep us in close touch with new market potentials and buying climates everywhere, and we have been able to alert many of our clients to new markets for their products. This counseling service has been augmented by our A & R (Agents and Representatives) plan and our I. D. (Industrial Distributor) plan. These two plans provide manufacturers' agents, representatives, and distributors with local marketing counsel and fortify the links between them and the manufacturers.

It can be readily seen that the services of a modern freight forwarder are invaluable to Western industry in overcoming the competitive transportation advantage presently enjoyed by the East. Our own company—I cannot, of course, speak with comparable authority about others—has done much to augment these regular services with "specials" designed specifically to strengthen the West, because we believe its future, tied in with the East, is limitless.



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EUTECTIC Welding News

PUBLISHED BY EUTECTIC WELDING ALLOYS CORPORATION, 40-40 172 STREET, FLUSHING 58, NEW YORK, N. Y.

WELD SAVINGS APPLICATION REPORT "FINDS" \$2754 FOR SO. TEXTILE MILL

Representatives of leading industries are beginning to appreciate and utilize the tremendous opportunity available for cutting maintenance and production costs with welding. They are accomplishing this through a Weld Savings Application Report prepared without obligation by trained Eutectic District Engineers. This Report is a welding specialists recommendation for lowering costs and increasing production.

One of this new and exclusive service pioneered by "Eutectic" given one Southern textile manufacturer added savings of \$2,000.00 through weld-repair of loom back boxes, card dobber rollers and other cast iron equipment previously considered unweldable. The same Weld Savings Application Report showed the way to a \$310.00 saving by replacing conventional play materials with Eutec-Trode 1851 (DC) for picker feed calendar rolls. Copies of the Weld Savings Application Report left with the Purchasing Agent and Weldor as a guide welding procedures, highlighted 38 additional weld savings applications.

Copies of this Weld Savings Application Report and reprints of similar reports prepared for various industries (TIS 2637) are available from Eutectic District Engineers or from Eutectic's Technical Information Service.



EUTECTIC AIR BASE OFFICERS CALL WSA "UNDERESTIMATED" AT \$2,000,000

A recent Weld Savings Applications Report conducted by two Eutectic engineers for the U.S. Air Force was judged to have been closer to \$10,000,000 for the North Atlantic Air Command than the original estimate of \$2,000,000. The basic purpose of the survey was to educate maintenance and air personnel in the latest development welding materials and techniques, and demonstrate how they could help to restore equipment damaged by 30 to 40 degree below zero temperatures, and over 100 miles per hour winds.



In one case, Air Force weldors successfully joined corrugated steel pipes at 20 below zero with Steel Tectic #1, a low amperage, multiple pass alloy for mild steel. Several cracked diesel engine blocks were salvaged by preparing with Eutectic's CutTrode and Chamertrode in the damaged areas, and welding with Xyron 2-24 and Xyron 2-25. High-strength, porosity-free welds were produced by these new and advanced low temperature, cast-in EutecticTrodes. In this application alone, Eutectic engineers achieved savings close to \$1,000,000. Additional savings were realized in the repair of 350 cylinder liners valued at about \$1,000 each. EutecRod 140, a high strength, high density deposit, was recommended for rebuilding 50 aircraft cylinder heads, resulting in additional savings of \$10,000. Eutec-TinWeld proved very effective in repairing diesel engine radiators; and EutecRod 1602, a specially developed, low-melting silver type alloy was the only successful method found for salvaging 50 aircraft fuel tanks. A ten minute, 16 mm film packed with practical know-how for saving time, machinery and money, showing some of the techniques and developments utilized by the U.S. Air Force in Greenland is available free of charge.

\$3,000 SAVED IN HEAVY EQUIPMENT

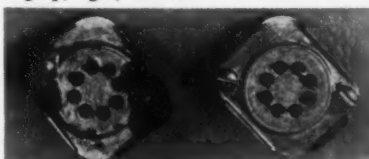


Replacement parts being discontinued for old earth moving equipment, an attempt to redesign the transmission cases under way in a Mid-West plant. Arrow illustration above indicate areas of great stress. Using EutecTrode 680 AC-DC, two machines were welded, tested for eight hours, and then torn down and inspected. The welds were perfect in every detail. Frequently, five machines were completely rebuilt, plus six more for other companies. Not one has failed. No keys were used; the weld takes all the strain. EutecTrode 680 AC-DC is an all-purpose,

corrosion resistant electrode for very high alloy and carbon steels with ultimate tensile strength up to 120,000 psi.

EUTECTIC-SILWELD ELIMINATES WASTE AND COSTLY "CLEANING UP"

An electronics manufacturer thought he would have no problem silver-soldering screws to radio sockets. UNTIL he tried to do it with conventional materials. The results he got are shown in the photographs at left, below. The solution was the use of Eutec-SilWeld 1618, which eliminated the waste of costly alloy and expensive cleaning up, right, below.



Eutectic-SilWeld is a new, high silver content alloy blended with special flux, in convenient, "paint-on," paste form. It eliminates the need for costly rings, shim and strips, is easier to use than conventional silver rods and alloys that require high heats. Many weldors are using Eutec-SilWeld 1618 to promote heavy "surface alloying," and to increase the flow of bead-forming alloys into butt joints.

The area of the weld where free flow is desired is simply painted with Eutec-SilWeld 1618. The area where a bead is required is left bare. The weldor then "runs" a EutecRod like 16FC, 185FC, 18FC, 146FC or 20FC. The result is a neat bead and a "neater" saving. As EutecRod mixes with the silver in Eutec-SilWeld 1618, the melting point is lowered. Tinning, cladding, coating and filling defects and porosities are all situations where the new Eutec-SilWeld 1618 offers worthwhile savings above the cost of welding with conventional silver brazing alloys.

CONTROLLED AREA HEATING GIVES MAXIMUM CASTINGS WELDS WITHOUT WARPAGE

To insure a good weld without warpage on cracked heads and blocks, many repairmen now follow this effective procedure: First they thoroughly clean the area around the break. Eutectic's Form-A-Jig is then packed to both the outer and inner surfaces of the casting, to within an inch of the break, localizing the heat to the weld area, and controlling warpage. The hole is then repaired with EutecRod 1900 and Eutector 1900 flux, a superior weld combination for magnesium. The excellent heat absorption qualities of Form-A-Jig permit the casting to be picked up with bare hands, without discomfort, as soon as the weld is complete.

EUTECTOR ALBRO-FLUX 1601 ELIMINATES ALUMINUM BRONZE JOINING PROBLEMS

Eutectic District Engineers are introducing the latest result of Eutectic's flux-minded research. Eutector Albro-Flux 1601, the newest of Eutectic's temperature indicating fluxes, helps eliminate the problems associated with joining and repairing all grades of aluminum bronze, and is ideal for joining aluminum bronze to non-ferrous metals normally silver bronzed.

Such industries as, fabricators of small marine parts, will find the new Albro-Flux 1601 solves problems found in torch-joining aluminum bronze. It makes possible joining and repair of parts too small for arc welding. Albro-Flux 1601 is particularly recommended for use with EutecRods 1600, 1601, 1700 and 1801.

The activity range of Albro-Flux 1601 is between 100 and 1600 degrees F. It permits use of a great variety of silver solder type alloys and allows replacement of standard tin bronzes with alloys providing much higher joint strength. The increased wetting activity and the ability of Albro-Flux 1601 to dissolve aluminum oxide means the molten silver alloy with which it is used flattens out and flows readily.

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50 BEST MANUALS on INDUSTRIAL PUMPS

— yours for the asking

Obtain your selection by circling item numbers on the WI rip-out postcard, page 69.

HOW-TO-DO-IT MANUALS reviewed on the following pages (68-76) actually constitute a handy self-service library from which Western plant operators may select important and up-to-date guides to selection, operation and maintenance of one of the most common, but often problematic, items of plant equipment — pumps. During the past three

months, these 50 manuals have been collected by the editors of **WESTERN INDUSTRY** to bring this library to life.

The reviews are designed to tell you quickly what particular phases of the handling of fluids or semi-fluid materials are discussed in each manual. By special permission of the manufacturers who published them, these manuals are offered free of charge to

key production and plant operating men in Western plants.

You are invited to check the listings and select those manuals that promise to be most helpful with your pumping problems. Circle appropriate key numbers on this month's **WI Reader Service Postcard** (page 69) and we will be glad to see that you obtain your selection promptly.

Expandable notebook of 55 pump pamphlets

Bound into an indexed and expandable notebook, these 55 pamphlets cover many different kinds of pumps. Each pamphlet has pictures and specifications, as well as general descriptive information. Included are single and double suction centrifugal pumps, turbine type, multi-stage centrifugals, boiler feed units, deep well turbines and other pumps for specialized applications. Some information is given about every pump in Pacific's line. *Pacific Pumping Co.*

... for your copy, circle No. 251

Two spec. sheets on bulk transfer pumps

These two single page specification sheets give principal features, specifications, and dimensions for bulk transfer pumps recommended for petroleum and similar liquids. Information is provided on the drive unit, sliding vanes, bearings, seals, pressure control valve, pipe connections and suction strainers. Engineering data covers length, width, height, weight, motor size. Instructions for selecting the proper pump models are also included. (Spec. sheets 100-C, 100-D) *Blackmer Pump Co.*

... for your copy, circle No. 252

Ingersoll-Rand pump specs, selection guides

The first of these booklets covers a centrifugal pump for liquids containing solids, air, or gases. Several pictures show the pump in use while others are used to show construction features. A large cutaway is included, while dimensions are given in chart and diagram form. A second booklet, with eight pages, explains single-stage "maintenance-free" pumps for general hydraulic services. Several pages point out special features of the pump and picture component parts to show why the pump is practically maintenance-free. The final section of the booklet gives instruction on how to select the correct pump for your particular application. Specifications are included. *Ingersoll-Rand.*

... for your copy, circle No. 253

How to solve pumping problems

This is the title of a 36-page booklet that contains just about everything you want to know about pumping problems and how to solve them. Section 1 gives a general explanation of rotary gear pumps and factors of pumping problems, while Section 2 is devoted to sample problems, such as might occur in the hydraulic system, and with general and pressure transfer. Section 3 covers technical data: friction loss, cylinder displacements, viscosity conversion chart, conversion factors, electrical data, and the materials of pump construction. *Geo. D. Roper Corp.*

... for your copy, circle No. 254

Solutions to your pressure pumping problems

The 32 pages of these three booklets on industrial high pressure power pumps were designed to help you solve pressure pumping problems. The first is a four-page booklet recommending dozens of uses for high pressure pumps in industry and picturing many of them. Two specific pumps are detailed and component parts discussed. (Catalog BWI 48) The other two booklets, with a total of 28 pages, give installation, maintenance, and service instructions, along with parts lists for a selection of John Bean's pumps. Both booklets are written in step-by-step outline form and are easy to read and understand. Diagrams and photographs are included. (Booklets L-907-1; L-1254) *John Bean Division, Food Machinery & Chemical Corp.*

... for your copy, circle No. 255

Gear-within-a-gear principle in rotary pump

A cutaway drawing in this brochure explains the gear-within-a-gear rotary pumping principle. Advantages and construction features of rotary pumps are given, along with installation and engineering data. A wide range of applications is listed also. General purpose, heavy-duty and large heavy-duty pumps and pumps for special applications are all included. Four maintenance sheets are available also, each discussing in more detail the pumps covered in the pamphlet. *Viking Pump Co.*

... for your copy, circle No. 256

Positive displacement internal gear rotary pumps

This is the title of an eight-page brochure which presents complete data on rotary pumps with their specifications and performance characteristics. The internal gear principle of these pumps is explained and illustrated, and an extensive pump guide in chart form is included, giving model, service, operating data, packing information, pump mountings and special features. *Tuthill Pump Co.*

... for your copy, circle No. 257

ABC's of self-priming centrifugal pumps

This 20-page booklet opens with an elementary explanation of the principle of centrifugal force, which leads into a thorough discussion of the self-priming centrifugal pump. Its operation is explained and several pumps are pictured. One section of the booklet covers applications for centrifugal pumps, while another treats installation and operation of both stationary and portable types, discussing discharge pipe, priming, rotation, starting, storage of pump, etc. A separate sheet pictures and discusses specialized pumps designed for specific industrial uses. (Bulletins X-52, IB-06) *Marlow Pump Co.*

... for your copy, circle No. 258

256-page handbook of fundamental hydraulics

Designed to help engineers who handle the installation of pumping machinery and those responsible for its functioning, this 256-page hydraulic handbook is divided into 12 basic sections, each of which is thoroughly indexed. The first section reviews hydraulic fundamentals; other sections cover pipe friction, conversion factors, water data, viscous and volatile liquids, solids in suspension, chemical liquids, mechanical and electrical data, and pump testing. The final section pictures and describes Fairbanks-Morse's products. This handbook is a compilation of hydraulic material published previously and now gathered into a single reference volume. *Fairbanks, Morse & Co.* . . . for your copy, circle No. 259

Four articles on centrifugal design, maintenance

These four articles, written by F. B. Applegate, deal with the choice, design, characteristics, and maintenance of centrifugal pumps. Physical laws controlling design and performance are considered first, then followed by development of design, multi-staging, performance or characteristic curves, changes affecting characteristic curves and the effects of changes in liquid on performance. Net inlet head is explained in the third article, along with some of the problems involving it and their solution. The fourth article on preventive maintenance for centrifugal pumps gives seven factors that are important in protecting pumps from erosion, chemical action, and motion. All articles are illustrated. *Pacific Pumps, Inc.*

. . . for your copy, circle No. 260

"Progressing cavity" pump for "non-pumpables"

This eight-page pamphlet describes the operation of the Moyno progressing cavity pump for handling practically anything from free-flowing liquids to non-pourable pastes, clean or contaminated with abrasives, chemically inert or active, homogeneous or containing solids in suspension. The Moyno pump is compared with a piston pump, rotary, centrifugal and turbine. The progressing cavity principle is thoroughly explained in both text and pictures and complete specifications for the pump are given. *Robbins & Myers, Inc.*

. . . for your copy, circle No. 261

Gear pumps for oils, varnishes, chemicals

The first of these two brochures gives information on Gearex pumps for oils, solvents, varnishes, and chemical solutions. Its eight pages give a list of recommended uses, selection data, and dimensions, as well as pointing out construction features on cross sectional photographs. Complete specifications are also given. (Bulletin G-2) A second booklet treats the Hydrex gear pump for heavy duty service, also pointing out special features on a cutaway. Dimensions and complete specifications are included, along with two pages of suggested applications. (Bulletin H-2) *Sier-Bath Gear & Pump Co., Inc.*

. . . for your copy, circle No. 262

Know-how information on submersible pumps

A list of pumping problems that lend themselves to treatment from submersible pumps is contained in this 12-page booklet, which pictures several uses of the pumps. A thorough discussion of the pump and motor, as well as the seal, is given along with specifications, diagrams showing parts and special features and a selection chart. A two-page listing of firms using submersible pumps concludes the booklet. (Bulletin P55-123) *Byron Jackson Division, Borg-Warner Corp.*

. . . for your copy, circle No. 263

Two brochures on balanced-power pumps

Design information and performance data for balanced power materials dispensing pumps are given in these two brochures. Special features are pointed out on a cutaway illustration of the pump. A pump selection chart is included, along with application data. Similar data are also given for a heavy duty pump recommended for applications of heavy compounds requiring higher pump ratios and material pressures. *Lincoln Engineering Co.*

. . . for your copy, circle No. 264

Four data sheets on self-priming pumps

Four data sheets presents facts on self-priming pumps, both plain bearing and ball bearing models. Information on operation, the self-priming feature, size, rpm., etc., is arranged in semi-chart form for quick reference. Performance charts are included as well as recommended uses for the pumps. *Jabsco Pump Co.*

. . . for your copy, circle No. 265

How to locate trouble in pumps

A four-page cartoon booklet, called "Locating Trouble in Pumps," shows in comic strip-type sequence all the ailments that pumps can get from failure to deliver water to the loss of capacity after starting. If you have sick pumps this pamphlet can help you locate the ailments. *Worthington Corp.*

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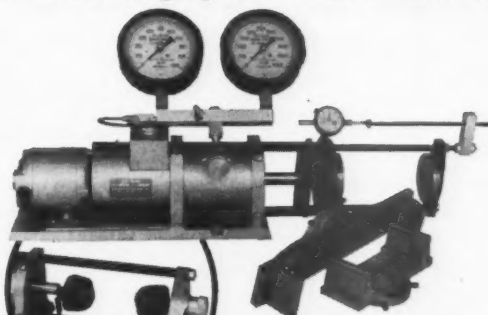
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Fundamentals of rotary and reciprocating pumps

This 16-page booklet, called "Pump Fundamentals," is an elementary outline of the characteristics, operation, and factors involved in selection of reciprocating, rotary, and centrifugal pumps. A section is devoted to the principles of operation, service factors, special features, and applications of each of the three types. These sections are followed by a general information section, which covers suction lift, discharge head, total head, horsepower definitions, and miscellaneous data. Well illustrated with photographs and explanatory diagrams. *Goulds Pumps, Inc.*

... for your copy, circle No. 267

Rubber lined pumps for handling abrasive material

Rubber lined pumps of 10 to 3,000-gpm. capacity for handling abrasive, fine-mesh material of $\frac{1}{8}$ in. to 325 mesh are detailed in a six-page pamphlet. A two-page cutaway photograph is used to point out construction features of the pumps—bearing brackets, stuffing box, seals, shaft sleeve, liners and casing. Tips for maintenance are given, along with dimensions and a range chart. *Allis-Chalmers Manufacturing Co.*

... for your copy, circle No. 268

Motor mounted, direct connected, and belt pumps

Three types of industrial centrifugal pumps—motor mounted, direct connected, and belt driven—are described in a four-page brochure, which also pinpoints features of high pressure and high pressure bulldozer types. Each is pictured and described briefly and special attention is given to impeller, rings, stuffing box, and rotary seal. *F. E. Myers & Bro. Co.*

... for your copy, circle No. 269

Brief introduction to Kinney rotary pump line

Kinney's complete line of rotary pumps is introduced briefly in this four-page brochure, which covers liquid handling pumps, high vacuum pumps, rotating plunger type, and the Heliquad rotary pump. Each is discussed and pictured. General information on the construction and operation of the pumps is given, while the final page has tabulated data on high vacuum pumps in chart form. (Bulletin 404) *Kinney Manufacturing Division, New York Air Brake Co.*

... for your copy, circle No. 270

Four books cover complete Bell pump line

Four booklets, totaling 28 pages, present the full line of Bell & Grossett's centrifugal pumps. The first booklet treats pumps with semi-open and enclosed impeller, discussing construction and showing features on a special cutaway. Four pages of selection tables and two pages of dimensions are given. The book concludes with installation and operation data. Other booklets give similar information for base mounted centrifugal pumps, pumps with mechanical seal and motor or belt drive, and the Uni-built pump. *Bell & Grossett Co.*

... for your copy, circle No. 271

Single stage, side suction industrial pumps

Industrial pumps designed for hydraulic conveyance of heavy liquids are the subject of this four-page brochure. Pumps, of the single stage, side suction, horizontal shaft type, are pictured with special features pointed out and complete specifications given. Included is a discussion of the materials used in the construction of the pumps, component parts, and maintenance. (Booklet 548-IP) *American Manganese Steel Division, American Brake Shoe Co.*

... for your copy, circle No. 272

Three models of plunger-type sludge pumps

Engineering data and specifications for three basic models of plunger-type sludge pumps—the Balto, standard, and heavy-duty—are given in a 16-page booklet. General information and pictures of each model are given in the first three sections. These are followed by a discussion of design features, lubrication data, pump selection charts, motor horsepower selection chart and finally specifications. (Bulletin 5102) *Ralph B. Carter Co.*

... for your copy, circle No. 273

Specification sheet on gear-head pumps

This specification sheet on gear-head pumps give detailed descriptions of the helical gear drive, sliding vanes, anti-friction bearings, mechanical shaft seals, pressure control valve, pipe connections, and suction strainers. Two models, both for bulk transfer of petroleum or similar liquids, are treated. An engineering drawing accompanied by tabulated data indicates dimensions, weight and motor size. Selection data table is included. (Spec. sheet 100-B) *Blackmer Pump Co.*

... for your copy, circle No. 274

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WESTERN INDUSTRY — October 1956

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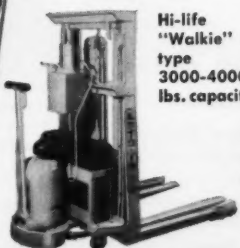
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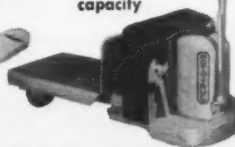
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Deep-well turbines with Redwood-lined oil lines

A deep-well turbine whose oil line tubing is completely lined with California redwood is the subject of a 16-page brochure, which explains the advantages of redwood over bronze bearings in oil tubes. Special features of bowl units, heads and other pump components are also discussed. The final part of the booklet is devoted to application pictures with brief explanatory paragraphs. *Western Pump Co.*
... for your copy, circle No. 275

Technical article on horizontal vs. vertical pumps

A four-page article by Melvin S. Mann of Peerless Pump is an engineering analysis of horizontal vs. vertical pumps, considering space requirements, priming, flexibility, corrosion, and maintenance. The article is well illustrated with drawings and photographs as well as a space requirement chart for the two types of pumps. *Peerless Pump Division, Food Machinery & Chemical Corp.*
... for your copy, circle No. 276

Handling cutting fluids for machining steel

This two-page article, titled "Handling Cutting Fluids for Machining Stainless Steel," is a case history article about Vanton's Flex-i-liner pump as it is used at Cooper Alloy Corp. to transfer used coolant from pumps to a barrel for disposal. Operation of the pump is explained and two application pictures shown. *Vanton Pump & Equipment Corp.*
... for your copy, circle No. 277

Facts on bronze rotary, impeller, centrifugal pumps

Three different types of pumps—rotary gear, rubber impeller, and centrifugal, are shown in this 24-page booklet on bronze pumps. The book opens with a chart listing the differences between the three types, then continues to treat each in a special section, giving capacity tables, dimensions, illustrations and price lists. Thirteen different series are covered. *Oberdorfer Foundries, Inc.*
... for your copy, circle No. 278

Brochure on oil lubricated frame mounted pumps

This six-page brochure on oil lubricated bearing pumps for pumping where corrosion, temperature, and contamination are problems explains the special features which make them suitable for those conditions. Discussed are bearings, frame, construction

materials, shaft and sleeve, impeller and wearing ring, and seal. Features are pointed out on a large cutaway photograph of the pump. One page covers alternate sealing arrangements, while the final section is devoted to specifications. *Allis-Chalmers Manufacturing Co.*
... for your copy, circle No. 279

Brief view of entire Warren pump line

This four-page pamphlet gives a brief view of the entire Warren pump line, which includes centrifugal, screw, reciprocating, and Rotex pumps. Each different model is pictured and detailed briefly. Twenty-four pumps are mentioned in all, with applications suggested, capacities given, and features pointed out. *Warren Steam Pump Co., Inc.*
... for your copy, circle No. 280

Rotary positive displacement meters and pumps

A four-page bulletin illustrates and describes rotary positive displacement meters and pumps for the petroleum industry. Many pictures are included, as well as specifications for meters and pumps for both tank trucks and bulk plants. Accessories are listed on the final page. *Granberg Corp.*
... for your copy, circle No. 281

Data on end suction centrifugal pumps

Complete information on end suction centrifugal pumps is given in this 12-page booklet which opens with pictures of the units and a cutaway with design features pointed out. Component parts are pictured and discussed, including impeller, shaft seals, stuffing box and vanes. Performance data is given in tables and curves. Final page covers dimensions. (Bulletin 4011-A) *Deming Co.*
... for your copy, circle No. 282

Specification sheets on turbine-type pumps

These two specification sheets on turbine-type pumps give very detailed drawings of several different types with every part listed and pointed out by key number on the drawing. Construction specifications are given in chart form while suggested applications are listed. One of the spec. sheets is devoted entirely to process pumps while the other covers pumps for a variety of uses. *Aurora Pump Division, New York Air Brake Co.*
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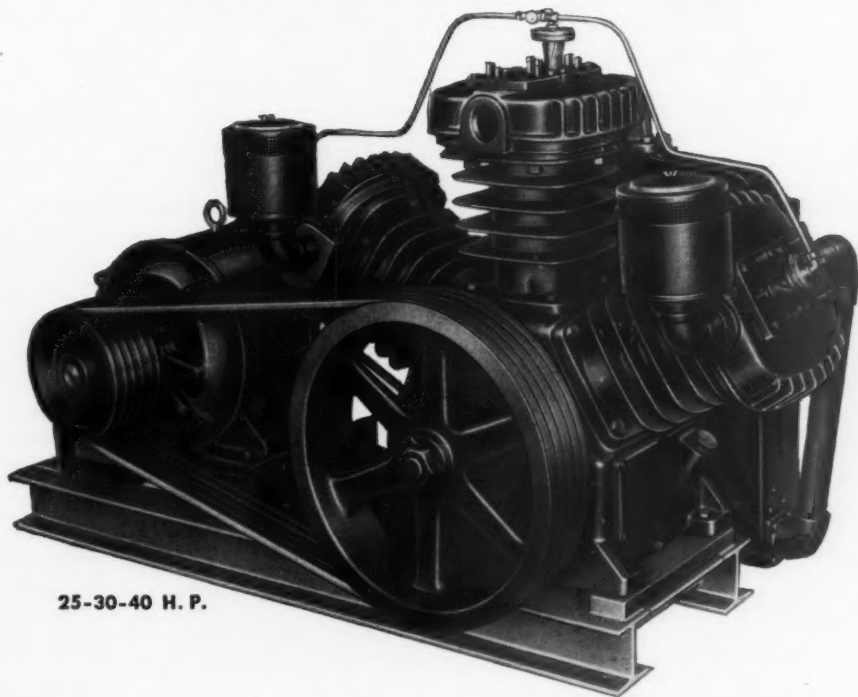
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WESTERN INDUSTRY — October 1956

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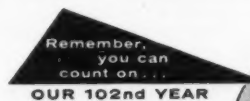
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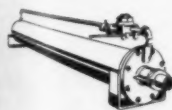


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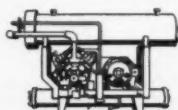
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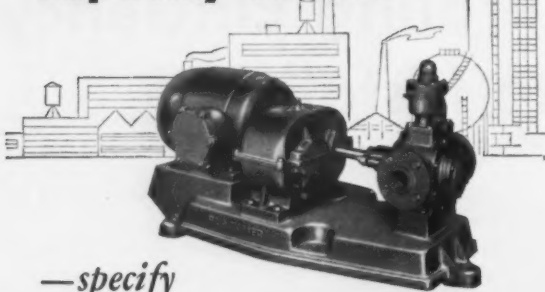
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Three types of vertical industrial service pumps

A 16-page booklet treats special service, heavy duty, and extra heavy duty vertical industrial service pumps for such applications as cooling towers, tank and line pumping, process and chemical pumping, drainage, booster pumping, and recirculation. General characteristics of the vertical pumps are given, along with specifications for the three types. Well illustrated with pictures of the pumps themselves and application photographs. (Bulletin B-505 Peerless Pump Division, Food Machinery & Chemical Corp.

... for your copy, circle No. 284

Data on centrifugal stock, chemical pumps

The first of these three booklets treats the single stage, double suction centrifugal pump with horizontally split case. It gives specifications, mechanical data, parts interchangeability chart, sectional view and parts list, as well as dimensions, performance curves, and general descriptive material. A special book on centrifugal stock pumps includes parts list, discussion of construction materials, performance curves and dimensions. The third book on chemical pumps designed for handling corrosive liquids gives similar information. *Goulds Pumps, Inc.*

... for your copy, circle No. 285

Screw pump for handling semi-fluids

Designed for pumping non-lubricating fluids and semi-fluids, such as crude oils, acetates and distillates, this external gear and bearing bracket type screw pump is the subject of a six-page brochure. Special features of the pump—center line support, single point alignment, radial and axial control—are explained with the help of a two-page cutaway photograph of the pump. Dimensions are given in both diagram and chart form. *Sier-Bath Gear & Pump Co., Inc.*

... for your copy, circle No. 286

Electric submersible heavy duty drainers

Four brochures give all pertinent information on the Flygt electric submersible heavy duty drainer, a pump designed to empty pits of sludge or muddy water. In addition to specifications, dimensions, construction features and general characteristics, the booklet tells how to operate the drainer and suggests other uses for it. Many application pictures are shown. *Stanco Mfgs. & Sales, Inc.*

... for your copy, circle No. 287

Specifications on general purpose centrifugal pump

This two-page specification sheet on centrifugal pumps for air conditioning and general purpose uses has one large photograph of the unit accompanied with some general information, then gives design and construction features, dimensions in chart form, and a parts list for one and three phase pumps. A capacity table is also included. *Perfection Manufacturing Corp.*

... for your copy, circle No. 288

Two brochures on general purpose centrifugal pumps

These two brochures on Electropumps, general purpose pumps for industrial and commercial use, give valuable selection data in the form of selection tables. Pump and motor dimensions are given in chart and diagram form, while a large friction table is also included. Pumps are pictured and construction features pointed out. (Bulletin 212A, 200-B) *Carver Pump Co.*

... for your copy, circle No. 289

Rotary pumps for manufacturing, processing

Four models in Roper's line of rotary pumps are described in this eight-page brochure which gives size and capacity, dimensions, construction features and other pertinent information for each model. All models are pictured, as are some of the component parts. Complete specifications are included. *Geo. D. Roper Corp.*

... for your copy, circle No. 290

Horizontal split case centrifugal pumps

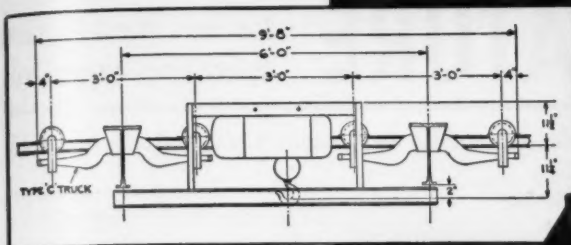
Four types of horizontal split case double suction centrifugal pumps are treated in this eight-page brochure, which has both cutaway photographs and detailed drawings of the pumps with parts pointed out on each. Component parts of the pumps are discussed, including casing, impeller, rings, shaft, bearings, glands, couplings, and base plates. Ball bearing assemblies for the four models are illustrated. Dimensions and specifications are given in chart form. (Bulletin 105-B) *Aurora Pump Division, New York Air Brake Co.*

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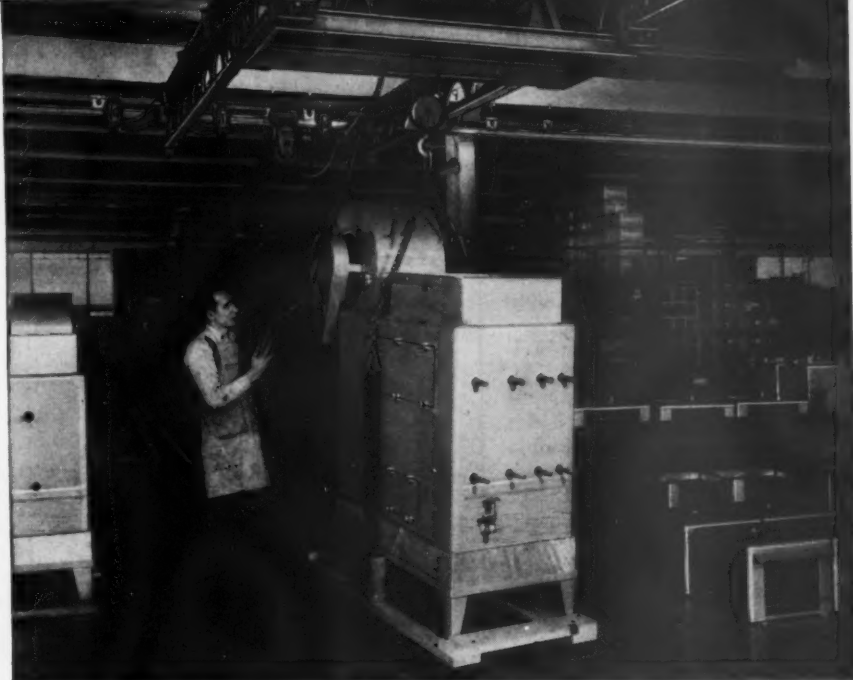
Pumps for industrial waste

Three types of pumps for sewage and industrial waste are treated in this eight-page booklet which opens with cutaway drawings on which special construction features are pointed out. There are three pages of performance curves for the pumps, while final pages cover dimensions, data on flanges, nozzle positions and general specifications. *Worthington Corp.*

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222-page handbook on tool room grinding

"A Handbook on Tool Room Grinding" is a 222-page pocket sized manual covering general tool grinding, carbide tools and cast alloy tools. Designed as a reference book for tool room use, the handbook is divided into sections which cover wheels for tool room grinding, sharpening high speed and cast alloy cutters, sharpening multi-tooth and single-point tools, grinding the chip breaker on carbide tools, hand honing, and miscellaneous tool room carbide grinding operations. A final section is devoted to 11 tables of useful information, such as grinding wheel recommendations, standard types of diamond wheels, abrasive for carbide lapping, relief tables for high speed steel cutters, grinding wheel speeds, and metric and decimal equivalents of common fractions. Circle number below to receive this Form 781. Norton Co.

... for your copy, circle No. 151

Engineering data on steel pipe fittings

This 28-page booklet on forged steel pipe fittings contains complete dimensional, engineering, and application data on forged screw-end and socket-welding fittings for high pressure service. Information is organized into charts for faster and easier location of facts on fittings. Included is information on forged steel unions, reducer inserts, welding bosses and special fittings. The engineering data section covers materials selection, pressure ratings, specs, tables, etc. (Bulletin A356) W-S Fittings Division, H. K. Porter Co., Inc.

... for your copy, circle No. 152

Hack saw selector for teeth, speed, feed

This pocket sized hack saw selector will determine the proper number of teeth and the correct speed and feed for metal to be cut in machine and hand hack saw operations. The selector is worked out so that printing on white background gives you information for hand blades, orange background for power blades. Selector also has a chart giving width of blade, recommended torque wrench readings, and recommended fixed tension device readings. Henry Disston Division, H. K. Porter Co., Inc.

... for your copy, circle No. 153

Introduction to Traveloader side loading handling unit

This booklet introduces the Traveloader, a side loading handling unit that carries things much like a straddle truck and stacks like a fork truck. The Traveloader system is explained and its advantages pointed out. Diagrams and application pictures are used to show how the unit can save space. Dimensions and specs are also given. (Bulletin 1360A) Baker-Raulang Co.

... for your copy, circle No. 154

Data on Bux magnetic drill presses, drill vises, plate clamps

How Bux tools use powerful electromagnetic forces to hold and position work for drilling and welding is described in eight-page application guide, complete with specs, descriptions, and photos of the tools in use on production and maintenance jobs. (To see how Bux tools are being used in Western plants, see article on pp. 44, 45 of this issue, "Any-position precision drilling.") Covered in the brochure are: six models of magnetic portable drill presses, for converting hand drills into portable, precision drilling units and adaptable for drills up to 2 in.; magnetic plate clamps to simplify drilling of irregularly shaped pieces; and portable magnetic plate clamps that eliminate other clamps, wedges, and deburring to reduce time by 50% on butt and lap welding. Western distributors are listed. Buck Manufacturing Co.

... for your copy, circle No. 156

Facts on the METCO line of electric tools

Pictures, specs, and prices on Milwaukee Electric's electric powered hand tools are provided in two brochures. (These are the tools discussed in the article on pp. 49, 50 of this issue "500 workers; 300 portable tools.") Among tools described are drills, nut-runners, screwdrivers, electric hammers, grinders, sanders, polishers, the Sawzall portable electric hacksaw, etc. Milwaukee Electric Tool Corp.

... for your copy, circle No. 155

How to plan a Hawaiian company party, convention

Everything in the way of decorations, costumes and flowers is covered in this eight-page brochure which tells you how to plan an Hawaiian company party or convention. leis from Hawaii, corsages, table decorations and settings, wall decorations and aloha shirts and hula skirts are all described with price lists given. The company, which handles parties and conventions for industrial and manufacturing plants, will also help you with food and arrangements for music. Hawaiian Paradise Products, Inc.

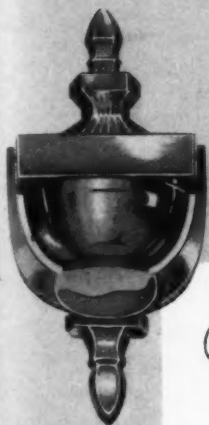
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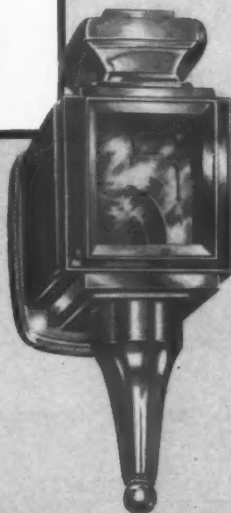
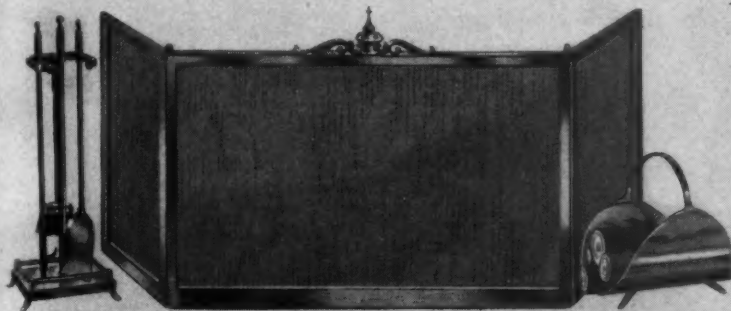
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UNISORB?

Mounts your machinery without bolts or lagging!

No holes in your expensive floors!

Reduces vibration as much as 85%!

Installation costs lowered about 30%!

AND THAT'S NOT ALL!

More quiet operation of machines improves workers morale — lowers occupation fatigue — reduces rejects on production machines — prolongs life of machinery and buildings!

**INCREASED EFFICIENCY
WITH LOWERED COSTS!**

To share in these benefits, now enjoyed by thousands of plants, phone, write or wire to

**Taylor Felt and Supply
Company**

Pacific Coast distributors for
THE FELTERS COMPANY (Boston)

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San Francisco 5	Los Angeles 14
Phone YUkon 6-0300	Michigan 8631

... for more details, circle No. 57

**Listing of clutches,
clutch-coupling units**

Several different clutches and clutch-coupling units are covered in this technical booklet, including an all-purpose ball bearing clutch, sleeve bearing clutch, and special purpose clutch. Complete dimension and engineering data is given in chart form. The booklet concludes with installation and maintenance information. (Catalog 103-C) *Formsprag Co.*

... for your copy, circle No. 158

**Replacement catalog covers
hose, fittings, couplings**

Designed primarily for use as a replacement catalog, this 12-page booklet lists hose, fittings, socketless kits, and self-sealing couplings. The catalog is an abbreviated version of the firm's complete line of products, and contains information on standard industrial items. Ordering instructions are included, along with data on installation planning and assembly of hose and fittings. *Aeroquip Corp.*

... for your copy, circle No. 159

**Large selection chart
for flexible couplings**

A 22 x 17-in. chart, suitable for hanging on the wall or inserting under a glass desk top, is designed to reduce

the time necessary to select a flexible coupling. Horizontal headings on the chart are Morse's three main coupling types and sizes with the bore diameter range of all coupling halves. NEMA electric motor frame numbers, both old and new, are listed in the left hand column in sequence according to shaft size. A shaft size column is included also. Under each separate coupling heading the bore diameter range is indicated by a color code as a cross reference with the appropriate shaft size. *Morse Chain Co.*

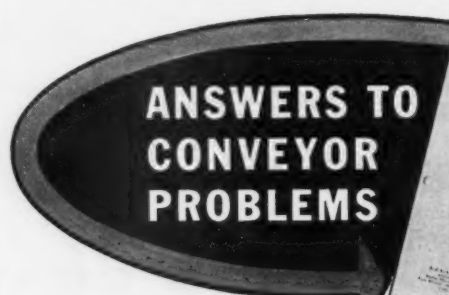
... for your copy, circle No. 160

**Book on features of
Clarklift fork line**

Called "Clarklift Features," this 16-page brochure gives construction details, operating characteristics, and maintenance features of the Clarklift line of fork trucks. Photographs and drawings explain many of the engineering features of the six-model line, while a special section on the Hydrotork drive describes the operation features of the power train. Two braking systems are illustrated and discussed, as are safety features. The illustrated book also includes a list of 34 components which are interchangeable on all models in the line. *Clark Equipment Co.*

... for your copy, circle No. 161

Yours for the asking...



NEW, 4-page catalog tells and shows how Yuba-Schrock internal drive head pulleys save space, cut downtime, promote safety; liberally illustrated with photos of Western applications. Diagrams and charts give dimensions and speeds for sizes from 1 to 125 hp.

See for yourself how "the head pulley with the motor inside" solves conveyor problems. Write for your FREE copy of this Yuba-Schrock folder NOW.



YUBA MANUFACTURING CO.

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... for your copy, circle No. 58 on Reader Service Postcard

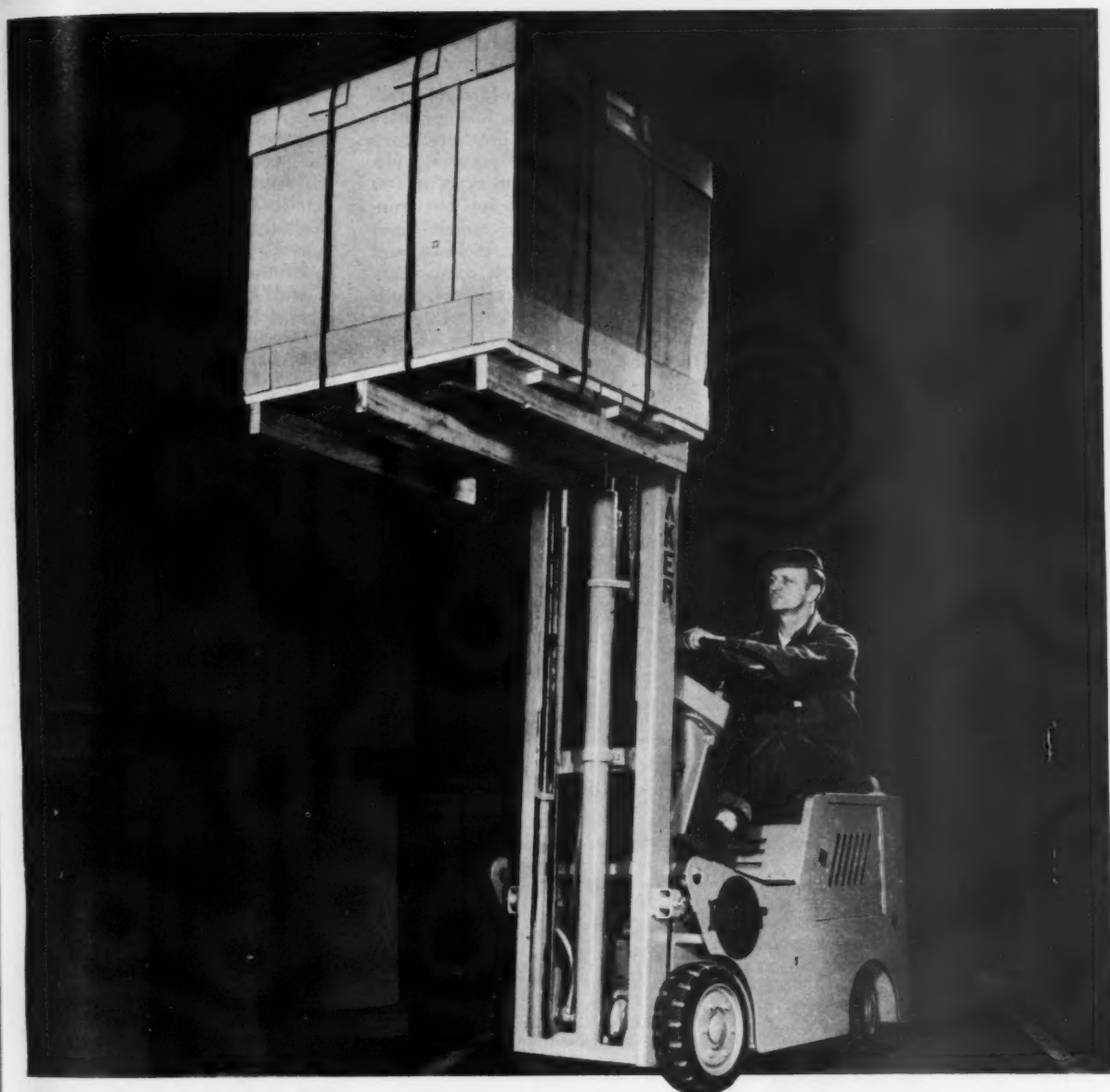
WESTERN INDUSTRY — October 1956

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Now Baker gives you Balanced Design in an all new 2000 lb. gas fork truck

This newest addition to Baker's outstanding line of gas-powered fork trucks now completes the range of models from 2000 to 7000 lbs. Like its companions it features Baker *Balanced Design*, with all elements coordinated to work together for top efficiency, maximum dependability and longest life.

For greatest operator convenience and safety it features absence of cowl and offset driver position for better visibility ... recessed seat for lower driver silhouette ... unobstructed

access for mounting from either side ... effortless automotive steer ... self-adjusting, self-energizing and self-equalizing hydraulic brakes.

Actual turning radius of this sturdy compact truck is only 61½ inches ... it operates in 57-inch intersecting aisles. Total lift 130 inches ... lifting speed 45 FPM, lowering 65 FPM ... travel speed 8 MPH forward, 7 MPH reverse —all with full load. Mast tilts 10° forward or back.

Baker

handling equipment

THE BAKER-RAULANG COMPANY

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A subsidiary of Otis Elevator Company

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... for more details, circle No. 59 on Reader Service Postcard

WESTERN INDUSTRY — October 1956

81

METAL & THERMIT

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to go with...

Welding

... M & T offers these vitals for sound welds: Murex Arc Welding Electrodes, AC and DC Machines, Inert-Arc Equipment, selected Welding Accessories, Thermit and Equipment... and gamma ray Radiographic Equipment for inspection and testing.



Chemicals & Metals

... M & T is the world's largest producer and supplier of Industrial Tin Chemicals and Materials... is headquarters for Ceramic Opacifiers and special Metals and Alloys.



Metal Finishing

... UNICHROME is M & T's label for quality processes and materials for chromium, bright nickel and copper plating... chrome finishes and organic coatings.



Stocks and warehouses are conveniently located across the country... technical experts will be glad to help.

METAL & THERMIT CORPORATION

GENERAL OFFICES: RANNEY, NEW JERSEY

... for more details, circle No. 60

Book of trucks for tow line operations

Trucks for all types of freight terminal and warehouse tow line operation are discussed in this brochure. Each unit is illustrated and many are pictured in use on various types of tow lines. Descriptions point out construction features, recommend uses and give dimensions. Pictures and details of various truck components are also included. Trucks for both single and combined shipments are treated. (Bulletin 54-TL) *Nutting Truck & Caster Co.*

... for your copy, circle No. 162

Inside facts on services offered by the Rucker Co.

This four-page pamphlet, called "Meet the Rucker Co.," introduces you to the design, engineering, manufacturing, and installation facilities of the firm. Pictured also is equipment for industrial hydraulic applications, farm and mobile hydraulic applications, and pneumatic applications. Examples of typical hydraulic and pneumatic units built by Rucker conclude the brochure. *Rucker Co.*

... for your copy, circle No. 163

Introduction to Multi-Pul heavy-duty power tool

This four-page leaflet is an introduction to Multi-pul, a new heavy-duty manually operated power tool designed to lift, lower, and pull. Construction features of the tool are listed along with special safety features. Two models of the tool are pictured and cable equipment and reel capacity for both given. Complete specifications are also included. Suggested uses for Multi-Pul are detailed on the final page. *Multiple Corp.*

... for your copy, circle No. 164

How-to work book for protective coatings

Designed as a practical work book, this manual on Tygon protective coatings presents painting data in the form of charts, tables, diagrams, and illustrations. The complete family of Tygon coatings and related primers is covered along with surface preparation, priming, application methods, and maintenance instructions. Care and cleaning of brushes and spray equipment is explained, and a table of chemical resistance included which gives the resistance rating of each coating to over 200 corrosive agents. (Bulletin 760) *Plastics & Synthetics Division, U. S. Stoneware Co.*

... for your copy, circle No. 165

70-page CF&I catalog lists principal products

Colorado Fuel & Iron's 70-page indexed catalog describes the firm's principal products. Listing is divided into broad classifications, which include semi-finished and hot-rolled steel, heavy and special steel items, rails and accessories, wire and wire products, overhead conveying equipment, industrial screens and wire fabrics, as well as hardware products, springs and formed wires, processing belts and various other product lines serving the mining, chemical, and construction industries. *Colorado Fuel & Iron Corp.*

... for your copy, circle No. 166

Specification sheet for electric "walkie" trucks

Electric powered "walkie" trucks are treated in this eight-page sheet, which covers the complete line. In easy-to-read form the sheet gives the capacities and dimensional specifications of all the lead-around trucks, and discusses outstanding construction details in pictorial fashion. Data on pallet trucks, low lift platform trucks, tractors, outrigger models and counterbalanced models are included. *Moto-Truc Co.*

... for your copy, circle No. 167

Introduction to services of Gate City Steel

This picture and fact book on Gate City Steel's operations covers in detail their warehouse operations, plan for contract manufacturing, working facilities, and past job experience. A list of the steel firm's offices and plants is given, along with a map showing their locations. *Gate City Steel, Inc.*

... for your copy, circle No. 168

92-page fact book on oil hydraulic valves

Oil hydraulic valves for controlling fluid power by controlling the operation of cylinders and motors is the subject of this 92-page fact book which gives performance data, capacities, types, sizes, details and mounting dimensions. Illustrations include photographs of typical installations, cutaway drawings and flow schematics of the valves needed for a complete heavy duty oil hydraulic circuit. (Catalog H-12) *Commercial Shearing & Stamping Co.*

... for your copy, circle No. 169

Specification book on new electric fork truck

A drawing and specification book has been published on Automatic Transmission's new Transporter stacker type, operator led electric fork truck. The four-page book opens with dimension drawings of the truck and devotes one page to specifications. Special features are discussed and illustrated on the final page. (Bulletin 1007W) *Automatic Transportation Co.* . . . for your copy, circle No. 170

358-page spiral book on conveying systems

A quick reference index leads you into this comprehensive 358-page hard cover book on conveying systems. Included are sections on roller and wheel conveyers, roller spirals, spiral chutes; belt and live-roller conveyers and belt and chain driven types; chain conveyers, trolley, pallet, apron, flight, and drag chain; and elevating and vertical suspended carriage types, vertical hoists and lifts, and inclined pusher-bar conveyers. Each section is completely indexed page by page for quick reference. This pocket sized loose leaf book is devoted in large part to engineering drawings and information given in easy-to-read chart form. (Catalog HB56). *Mathews Conveyor Co.*

. . . for your copy, circle No. 171

Ross Engineering's facilities for sheet metal fabrication

This four-page brochure briefs the facilities available at Ross Engineering's new Los Angeles plant for industrial sheet metal fabrication. Advantages of the new plant are given along with pictures of work in progress. The pamphlet also includes a list of products—from benches to water seal hoods—that the firm makes. *J. O. Ross Engineering Corp.*

. . . for your copy, circle No. 172

Specification sheet details electric platform truck

A four-page booklet on an electric driven operator led platform truck in Automatic Transportation's Transporter line gives complete specifications and dimension drawings of the unit. Four special features of the platform truck are illustrated and explained on the final page. (Bulletin 1003W) *Automatic Transportation Co.*

. . . for your copy, circle No. 173

METAL & THERMIT a dependable source for special

Chemicals & Metals



Buyers of chemicals and other products derived from tin, antimony, and zirconium have learned to depend on one reliable source—Metal & Thermit, whose nationwide warehouse and sales facilities assure them prompt delivery and dependable service.

Make Metal & Thermit *your* one source for:

TIN CHEMICALS—Metal & Thermit is the world's principal supplier of inorganic and organic tin chemicals.

ANTIMONY CHEMICALS—Metal & Thermit is a leading producer of high quality antimony chemicals including antimony oxide, sodium antimonate and potassium pyroantimonate.

ZIRCONIUM PRODUCTS—ULTROX® zirconium opacifiers for ceramic glazes and other M & T zirconium products are of unvarying quality.

CHROMIUM, FERRO-TITANIUM, NICKEL-TITANIUM—of carefully controlled analysis.

When you need any of these special chemicals and metals, it will pay you to give us a call.

TIN & TIN CHEMICALS
CERAMIC MATERIALS
ORGANIC COATINGS
WELDING SUPPLIES
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METALS & ALLOYS
HEAVY MELTING SCRAP



"First Name in Tin Chemicals"

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CORPORATION**

LOS ANGELES, CAL. SO. SAN FRANCISCO, CAL.

. . . for more details, circle No. 61 on Reader Service Postcard

Be Wise

Economize

Standardize

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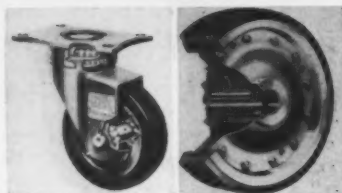
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SWIVEL

and **ROLL**

DARNELL

CASTERS AND WHEELS



**Check These
Greater Dollar Saving Features**

RUBBER TREADS . . . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

RUST-PROOFED . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

LUBRICATION . . . all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Zerk fittings are provided for quick grease-gun lubrication.

STRING GUARDS . . . Even though string and ravelings may wind around the hub, these string guards insure easy rolling at all times.

**JUST OFF
THE PRESS**

The NEW

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36 NORTH CLINTON STREET, CHICAGO 6, ILLINOIS

... for more details, circle No. 62

**Book describes Towmotor's
Pace-Maker lift trucks**

This 32-page book describes Towmotor's Pace-Maker series of fork lift trucks and includes the four new additions to the line. The illustrated book shows the design and operating improvements incorporated in the new models, including changes in steering, transmission, brakes. Book is illustrated with photographs, cutaways, diagrams and schematic drawings. *Towmotor Corp.*

... for your copy, circle No. 174

**Die handling trucks
for inclined presses**

An engineering booklet illustrates and describes a new line of die handling trucks for inclined presses. The rotating platform feature is pointed out and discussed, as are other special design and operational features. *Elwell-Parker Electric Co.*

... for your copy, circle No. 175

**Using flammable liquids
safely in plant operations**

"Flammable Liquids—Their Characteristics, Hazards, and Safe Handling" is a practical, non-technical, and illustrated explanation of the nature and safe plant use of flammable

liquids, covering all phases of their handling and application in production procedures. Three sections of what will be a continuing series of leaflets are included in this loose leaf binder. First section covers characteristics of flammable liquids, including flash point and explosive range and a table listing determining factors for 19 flammable liquids. The second section covers control of flammable liquids and their vapors, while the third section treats actual plant procedure in handling these liquids. By circling the number below you will receive the three sections and the cover binder; your name will also be added to the list to receive future issues of this series. *Protectoseal Co.*

... for your copy, circle No. 176

**Spray lubrication system
for gearing, slide surfaces**

Descriptions of manual and automatic spray lubrication systems and component equipment for open gearing and slide surfaces are included in this eight-page brochure. Schematic layouts and application photographs are given along with special engineering considerations. One page is devoted to the sequence of operation. *Farval Corp.*

... for your copy, circle No. 177

THE Hydro^{Electric} LIFT TRUCK

pays for itself . . .
with the savings it makes



- 2 Drive Wheels instead of one
- 2 Braking Systems available instead of one
- 4 Wheel Stability instead of three
- Alloy Gear Transmission instead of chains
- 100% more Steering Ease—Greater Maneuverability
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- Finger-Tip Control—Greater Safety

The ease of operation, speed, safety, power and economy of Hydroelectrics, users report, make it possible for them to pay for themselves five to twelve times per year.

The exclusive Hydroelectric modern features give you top performance day in and day out the year around, which today's material handling requires, at the lowest cost.

Write for complete
information today!

STUEBING Designed • Engineered • Built

LIFT TRUCKS, INC. / CINCINNATI 14, OHIO



THERE IS A TRUCK FOR EVERY PURPOSE TO HANDLE ANY KIND OF MATERIAL.

... for more details, circle No. 63 on Reader Service Postcard
WESTERN INDUSTRY — October 1956

120 pages of engineering data on tube expanders

This 120-page engineering data book is full of detailed information on tube expanders and association tools used for tube rolling. Of special interest to engineers and superintendents responsible for maintenance or manufacture of boilers, condensers, evaporators or heat exchangers, the manual has special sections devoted to expanders, general accessories, measuring instruments, rollers, extensions, and drives. Each piece of equipment is described in detail and uses suggested. Current information on tube expansion methods, tool maintenance, and expansion calculations and charts are given also.

Thomas C. Wilson, Inc.

... for your copy, circle No. 178

Advantages of Acme's floor surfacing armor

"The Floor That Heavy Loads Can't Lick" is the title of a four-page leaflet describing the advantages of Acme steel floor plate, a floor surfacing armor designed for the reinforcement and protection of concrete floor surfaces that are subjected to heavy industrial loads. Instructions for installation are pictured and outlined and a short section on maintenance included. *Acme Steel Co.*

... for your copy, circle No. 179

Booklet on in-the-floor, overhead dragline conveyor

Both the overhead and the in-the-floor types of dragline conveyor are treated in this 24-page booklet, which covers design, application, and installation of these Trukveyors. Designed for those interested in mechanizing warehouse and freight terminal operations, this illustrated booklet also treats conveyor components. *Link-Belt Co.*

... for your copy, circle No. 180

How to install and care for steam pumps

A step-by-step series of 88 pictures and explanatory captions in this 24-page booklet presents information on installing and taking care of steam pumps. Designed specifically to help operators and maintenance men get reliable service from their pumps, the booklet offers 28 tips on proper installation and 54 tips on field-proven care techniques. The four common types of steam pumps are illustrated and discussed briefly. (Bulletin G 2280 P) *Worthington Corp.*

... for your copy, circle No. 181

Ledeen VALVES for longer life



Model HMN

Hand operated to Forward and Reverse. Manual Return to Neutral. 30° throw each way. 60° total throw. Rated at 250 psi.

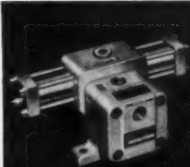
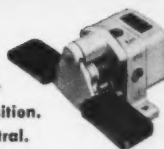


Model HSR

Hand operated to Forward Spring Return to Reverse. No stop in Neutral position. 60° total throw. Rated at 100 psi.

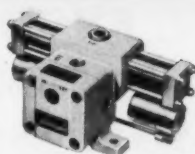
Model FSN

Foot operated to Forward and Reverse by depressing proper pedal to extreme position. Spring Return to Neutral. 15° throw each way. 30° total throw. Rated at 100 psi.



Model POR

Power operated to Forward or Reverse. No Neutral position. Total throw 60°. Rated at 250 psi.

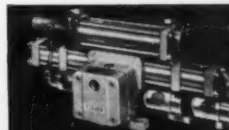


Model POR

SOLENOID OPERATED

2-position, Power Valve for remote control or automatic operation.

Momentary or continuous energizing.

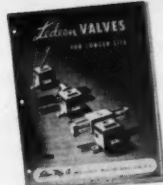


Time Delay Valve

Pneumatic Time Delay Valve. Adjustable

from 2 seconds to 2 minutes.

Available in POR and PON Models.



Write for Bulletin 1010

Ledeen Valves are built to operate single or double acting pneumatic and hydraulic cylinders, and motors. These valves embody the rotating disc construction to give the longest possible life. They are built in sizes from 1/4" to 1 1/4" standard pipe connections. Available from stock for quick delivery.

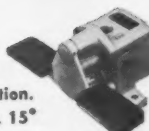


Model HSN

Hand operated to Forward and Reverse. Spring Return to Neutral. 30° throw each way. 60° total throw. Rated at 100 psi.

Model FFN

Foot operated to Forward and Reverse by depressing proper pedal to extreme position. Foot Return to Neutral. 15° throw each way. 30° total throw. Rated at 250 psi.



Model FSR

Foot operated to Forward. Spring Return to Reverse. No stop in Neutral position. 30° total throw. Rated at 100 psi.



Model PON

Power operated to Neutral, Forward and Reverse. Total throw 60°. Rated at 250 psi.

Model PON

SOLENOID OPERATED.

3-position Power

Valve for remote control or automatic operation.

Momentary or continuous energizing.



Pilot Valves



3-way Finger, Cam, Air and Solenoid operated models available in Normally Open and Normally Closed types.

Ledeen Mfg. Co.

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Los Angeles 15, Cal.

VALVES • CYLINDERS • VALVE ACTUATORS
AIR-HYDRAULIC PUMPS AND BOOSTERS

... for more details, circle No. 64 on Reader Service Postcard



... all the vibrators in our San Francisco warehouse were operated at one time, the West Coast would shake to the realization that Cleveland has a tremendous stock of air and electric vibrators ready for immediate shipment.

All sizes and types of vibrators are available. We can shake anything from a can of baby powder to a railroad car!

What's your problem? Our competent engineers are ready to assist you.

AIR *and* ELECTRIC



7 Front Street • San Francisco 11, California
2914 Clinton Ave. • Cleveland 13, Ohio
... for more details, circle No. 65

86

36-page engineering manual on cable conveyor systems

Indexed into nine sections for quick reference, this 36-page engineering manual is designed to furnish all the information needed to order and install a Tipp cable conveyor system. It includes a diagrammatic plan for layout and dimensional calculations also. The first section gives a general description of the conveyors, the second section contains the layout. Other sections include charts, data sheets, formulae, engineering drawings, component parts, and prices. A separate section describes the automatic safety controller that provides warning and prevents damage from abnormal load conditions of any kind on electrically driven conveyor systems. *Tipp Manufacturing Co.*

... for your copy, circle No. 182

10 rules for safety in conveyor operation

This is the title of a four-page folder that deals with safety rules that should be followed when installing a conveyor. Many different types of conveyors are covered, including overhead, belt, slat, and bucket elevator. If you contemplate installing a conveyor system you may find this booklet helpful. *Jervis B. Webb Co.*

... for your copy, circle No. 183

Best ways to weld studs to steel

This 12-page brochure is addressed to the design engineer, telling him how to use the Nelson method of welding to steel. Advantages of the method are listed, and the brochure covers problems of selecting and specifying studs and welding power requirements. Two pages cover stud specifications, others treat stud locating methods and template design, dimensions, counterbore and countersink, and physical properties. *Nelson Stud Welding Division, Gregory Industries, Inc.*

... for your copy, circle No. 184

Guide to precision tools for production, maintenance

This 36-page book opens with a complete index to the variety of precision tools included for production work, tool room use, and maintenance use. Covered are tool post grinders, quills, hand grinders, shaft tools, automatic drill head, air line drill head, as well as portable drilling units, a drill grinder, fractional horsepower motors and accessories. Each section contains pictures, charts, descriptive paragraphs, and specifications. Application pictures are also included. (Catalog 55-FL) *Dumore Precision Tools.*

... for your copy, circle No. 185

Presenting another **NEW**

WISCONSIN

HEAVY-DUTY

Air-Cooled

ENGINE

the **FULL-POWERED**

V-type 4-Cylinder 30 hp. Model VH4



This rugged new engine has been added to the Wisconsin line to fill the horsepower gap between the Model VF4 25 hp. and the Model VG4D 36 hp. Wisconsin Engines. At the same time, the mounting base is dimensionally identical to the Models VE4 and VF4 to permit convenient replacement of the latter engines if greater power is required.

The Model VH4, which now makes its bow for the first time, is the most powerful engine of its type and size available today, in our estimation. It is an engine of basic High Torque design which gives it the important advantage of being able to deliver maximum usable *Lugging Power* that carries the load through the hard, heavy pulls. It has been designed to give you the best possible performance at all engine speeds from 1400 to 2800 rpm., even when operating under intermittent shock-loads or under constant load, continuous service. It is an exceptionally smooth-running, even-firing engine and has all the traditional heavy-duty features that characterize all Wisconsin Models, from 3 to 36 hp. — built for hard service at all temperatures up to 140° F.

Learn more about this new engine. Write for Bulletin S-196 for detailed data and engineering specifications. Also ask for Service Map Bulletin, Form S-198.



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

... for more details, circle No. 66 on Reader Service Postcard
WESTERN INDUSTRY — October 1956

Installation manual for Transite pressure pipe

"How to Install Transite Pressure Pipe for Overhead Industrial Water and Process Lines" is a pocket sized 48-page guide with more than 50 illustrations. It is divided into 15 sections and gives complete step-by-step instructions and explanations for such operations as hanging and supporting the pipe, bracing for thrusts, machining and cutting, and also treats the poured flange coupling, the Roto-Split flange coupling, expansion and contraction, testing, and typical Transite pipe systems. The last few pages of the guide include diagrams of overhead lines. Indexed. *Johns-Manville.*

... for your copy, circle No. 186

Quick reference for 25 industrial trucks

Designed as a quick reference to 25 different Hyster industrial trucks ranging in capacity from 1,000 to 30,000 lb., this 12-page brochure illustrates the latest trends in lift truck design and gives brief information about each model. Highlighted are the new 3,000, 4,000, and 5,000-lb. capacity series of trucks on pneumatic tires, and the Space Saver and Monomast series. The booklet illustrates attachments. *Hyster Co.*

... for your copy, circle No. 187

Complete data sheet for expansion type bellows

Everything you want to know about expansion type bellows is contained in this six-page brochure, which opens with an explanation of what the bellows are, gives specifications, and ordering instructions. Both male and female nesting types are included; several pictures of each are given. The firm's engineering service for solving bellows problems is also mentioned. *Titeflex, Inc.*

... for your copy, circle No. 189

Properties, applications of hollow machining stock

This illustrated technical brochure treats hollow aluminum bar stock, discussing tolerances, mechanical properties, and applications. Case histories and comparison charts, demonstrating machining performance, are also presented. Booklet concludes with tables of the standard sizes available in round and hexagonal stock, listing wall thicknesses, dimensions, and weight per foot. *Harvey Aluminum.*

... for your copy, circle No. 190

Houston Paper Company, Houston, Texas:

We chose **Sturdi-Bilt** Adjustable STORAGE RACKS *

because they are

**EASIER
TO ERECT**

**SIMPLER
TO ADJUST**

**COST LESS
TO EXPAND!**



Only 3 Basic Parts

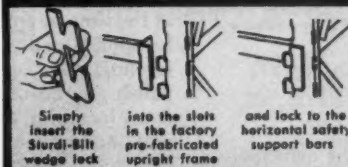


Upright frames

Exclusive safety support bars

Wedge lock

WITH EXCLUSIVE Float Wedge Construction

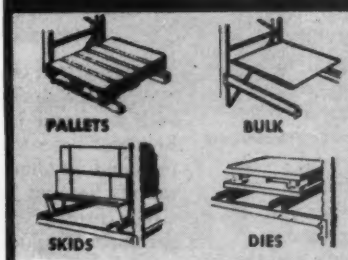


Simply insert the Sturdi-Bilt wedge lock

into the slots in the factory pre-fabricated upright frame

and lock to the horizontal safety support bars

Instantly Interchangeable for



PALLETS

BULK

SKIDS

DIES

104 RACKS INSTALLED IN 30 MAN HOURS BY "GREEN" LABOR

Less than 1/2 of 1% of material cost!

The Houston Paper Company, Houston, Texas, was "sold" on Sturdi-Bilt Adjustable Storage Racks the moment they saw a demonstration of exclusive "Float Wedge Construction"!

No other rack could match Sturdi-Bilt's speed, low cost and ease of installation—

WITHOUT TOOLS, BOLTS, NUTS, ERECTION WELDING OR SPECIAL LABOR (Installed cost of Sturdi-Built was actually 1/2 of 1% to cost of material compared to others 4% to 17%).

No other rack offered Sturdi-Bilt's flexibility—INSTANT RESPACING, REARRANGEMENT, EXPANSION OR RELOCATION AT ANY TIME—WITHOUT TOOLS—NO PARTS LOSS!

Looking to future expansion—Houston Paper Company considered Sturdi-Bilt's low cost for add-on storage facilities—

ALL COMPONENTS ARE STANDARD, PRODUCED WITH THE ECONOMIES OF PRODUCTION RUNS!

Write for details of how this new time-saving, money-saving, work-saving storage system can benefit your company, too! Dept. WI-10

*U.S. Patent No. 2740650
Other patents pending



Sturdi-Bilt Engineering Co.
2501 Peterson Ave., Chicago 45, Ill.

DISTRIBUTED BY

Andrey Co., 2479 Fletcher, L. A., Calif.
M. E. Canfield Co., 419 E. 3rd, L. A., Calif.
Green Penny Co., 421 E. Washington, L. A., Calif.

... for more details, circle No. 67 on Reader Service Postcard

NEW EQUIPMENT for Western plant operation, production, and maintenance

USE RIP-OUT POST CARD, page 69, for more information on products described.

PORTABLE NUCLEAR REACTORS

... mass produced for the first time



Mass production has begun on a small portable self-contained nuclear reactor which can be placed in an ordinary room for a multitude of applications. Because of a core fabrication with radiation-stabilized polyethylene moderator, the reactor resembles a liquid homogeneous reactor but actually has a solid homogeneous core. The unit requires for critical mass approximately 600 grams of uranium 235 or 20% enrichment, which is a very small amount. The quadruply sealed solid core locks in the fission products, eliminating the problem of waste disposal and preventing the escape of any radioactive contaminants. Under normal operating conditions the core life should exceed 300 years. A thermal safety fuse is built into the core as an additional safety feature, while reactor safety and control rods are actuated from the reactor control console which provides continuous reactor monitoring. The reactor can be used in the industrial field for rapid, non-destructive, chemical and physical analysis and process control utilizing techniques such as activation analysis, danger coefficient, and pile oscillator tests. *Aerojet-General Nucleonics.*

... for more details, circle No. 191 on postcard

TRIPOD STORAGE TANK

... designed as low-cost structure



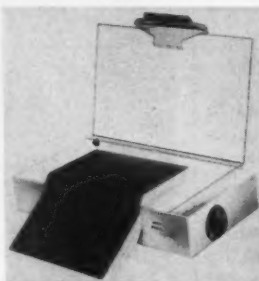
Economy is the principal advantage of this all welded elevated water storage tank. Cost of the tripod structure runs considerably less than that of an ellipsoidal or hemispherical tank of equal capacity. The simplified design of the tripod elevated tank makes the total painting area less—another cost-cutting feature—because of the reduction in number of supporting columns and the omission of a large central riser and balcony. The quantity of concrete re-

quired for foundations is less also. The three tripod columns, which range from 8 to 22 in. in diameter, eliminate the need for sway bracing in the top panel. The riser pipe is usually 6 to 10 in. in diameter. If the tank is to be used in cold areas, a frost casing to insulate the riser pipe is indicated. Capacities of the tanks are relatively small—from 15,000 to 75,000 gal. Standard heights to the bottom of the tank range from 25 to 100 ft. for the 15,000 to 30,000-gal. capacity tank and 25 to 125 ft. for the 40,000 to 75,000-gal. capacity model. *Chicago Bridge & Iron Co.*

... for more details, circle No. 192 on postcard

PANEL-LITE COPIER

... clearly copies book and magazine pages



The Panel-Lite Copier has been designed to copy pages from books and magazines and other material requiring a flat bed printer. It enables close contact on any bound page, and makes a clear copy of the entire page from gutter to outside edges. The copier is lightweight and compact, measuring 19½ x 13 x 4 in. overall,

and is made with a built-in automatic timer. The copying surface is of three-ply filtered glass and has a removable cover. *American Photocopy Equipment Co.*

... for more details, circle No. 193 on postcard

FLOOR POLISH

... minimizes danger of slipping

This emulsion-type floor polish contains no wax and is not slippery, according to the manufacturer, and therefore minimizes the danger of accidents resulting from falls. The polish, called SafeGuard, does not require polishing at the time of application as it has a natural luster. It may be applied and removed by standard methods and is self-leveling, quick drying and resistant to heel marking. The polish can be used with chemical safety on any type of floor, including asphalt tile, rubber, linoleum, wood, cork, vinyl and cement. *Columbia Wax Co.*

... for more details, circle No. 194 on postcard

CIRCUIT BREAKER

... protects double-voltage equipment

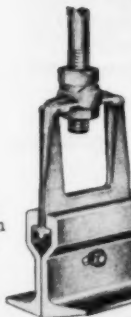
A dual-rated circuit breaker is designed to protect equipment which operates on either of two different voltages, such as 6 and 12-v., d-c., or 110 and 220-v. a-c. Circuit breakers have two ratings: for example, 2 and 4 amp. or 5 and 10 amp. with separate load connections for each rating. Because of its hydraulic-magnetic operation, the circuit breaker's ratings are unaffected by ambient temperature. The dual-rated circuit breakers are available with one of three inverse time-delay characteristics or in an instantaneous-trip form. Maximum voltage is 480 a-c. or 125 d-c. *Heinemann Electric Co.*

... for more details, circle No. 195 on postcard

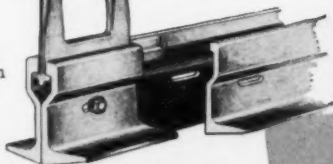
Free-moving
crane.



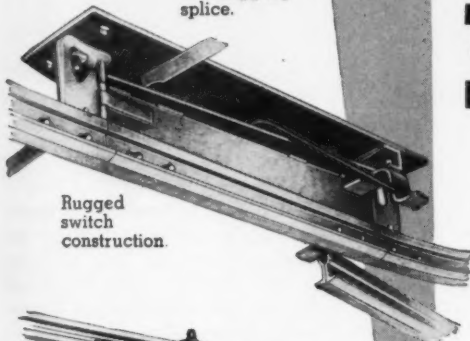
One-piece
forged
hanger.



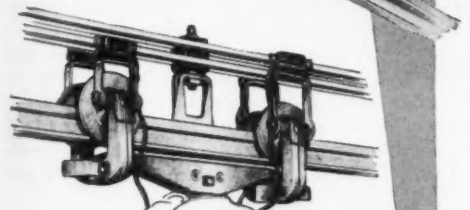
Twin
section
track.



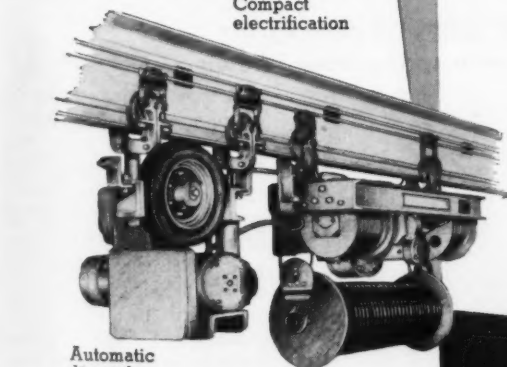
Overlapping
splice.



Rugged
switch
construction.



Compact
electrification



Automatic
dispatch
carrier.



TAILOR-MADE SYSTEMS FROM STANDARD PARTS

Standard American Monorail units offering the many advantages illustrated, are combined into systems for handling any type of unit loads.

These systems are available for manual, electric or automatic operation with local or remote control.

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Grover Engineers
44 McLea Court

Portland 7, Oregon
McMahan Bros., Inc.
337 Pittock Block

... for more details, circle No. 68 on Reader Service Postcard

SOUND CATCHER

... minimizes deafening noise

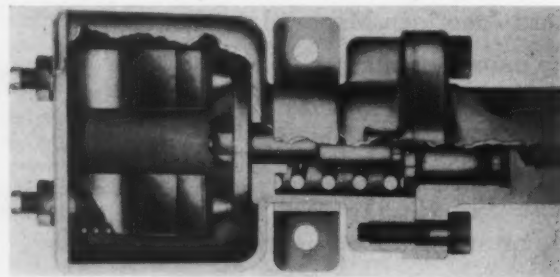


The Acoustosorber is a pyramid-shaped acoustical unit that serves as a sound catcher when suspended from the ceiling in factories and on other premises where noise must be minimized. The unit is composed of an outer sheet of perforated aluminum backed with a mineral fiber blanket which is 2 in. thick. The sheet is shaped into a box-like pyramid 28 in. long on a side and with an altitude of 24 in. Suspended from the ceiling on wires, it weighs about 1 $\frac{3}{4}$ lb. According to the manufacturer, the sound catcher will reduce loudness level as much as 50%. *United States Gypsum Co.*

... for more details, circle No. 196 on postcard

PISTON PRESSURE SWITCH

... senses two pressures in one system

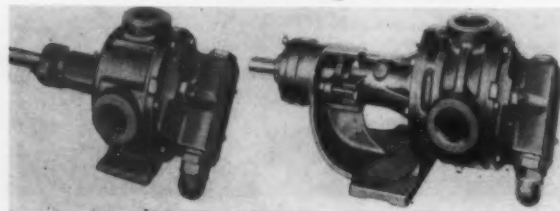


This piston pressure switch will sense two different pressures in one system and actuate independent electrical circuits at any two desired points. It will accurately sense any system pressure over an adjustable range of 15 to 3,000 psi. for proof pressures from 3,000 to 7,000 psi., depending on switch setting. Pressure settings are made by two external adjustment screws which can be locked in place to avoid accidental disturbance. *Barksdale Valves.*

... for more details, circle No. 197 on postcard

INTERNAL GEAR ROTARY PUMPS

... with circular tooth design in rotors



Five new series of internal gear rotary pumps all have circular tooth design in their rotors and idlers which results in rolling contact and smoother engagement of teeth, reducing friction and raising volumetric efficiency. Standard duty pumps, called Series A, come in 10 basic sizes from 3 to over 100-gpm. maximum capacities in two speed ranges up to maximums of 650 and 1,800 rpm. This group will handle liquids of light to medium viscosities

at pressures of 125 psi. Series B pumps are similar to those of Series A, but are designed for handling hazardous liquids such as naphtha and benzene. Series C is for heavy-duty applications—bulk station uses, truck mounting, etc. Medium to high viscosity liquids are pumped by units in this group. Series D units will handle L-P gases and other highly volatile substances at up to 100 gpm. Asphalt and other materials of medium to high viscosities requiring a heated circuit and pump can be handled by the steam-jacketed Series E group. *Wayne Pump Co.*

... for more details, circle No. 198 on postcard

TACHOMETER GENERATOR

... for speed measuring and regulation

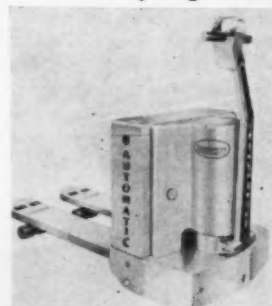


This a-c. and d-c. small diameter tachometer generator for industrial applications such as speed measuring and regulation is designed for incorporation into variable-speed drive systems. The totally-enclosed units are of ball bearing construction and protected terminals are located in an easily accessible conduit box. The four-pole a-c. tachometer serves a speed range of 400 to 5,000 rpm. and has a voltage output of 28 v. per 1,000 rpm., plus or minus 10%. Low shaft inertia and 1.5% ripple are two special features of the d-c. tachometer generator, which is designed for high-accuracy speed indication and feedback regulation. Models are available for both 50 and 100 v. per rpm. *General Electric Co.*

... for more details, circle No. 199 on postcard

NEW SERIES OF TRUCKS

... with spring-loaded pawls



A re-designed series of operator-led electric industrial trucks feature the Pallet-Chek, consisting of a system of spring-loaded pawls which holds the pallet firmly while the forks enter and leave, eliminating the necessity for chamfering end boards in double-faced pallets and also cutting down on handling time. The pallet units measure only 21 $\frac{1}{2}$ in. plus length of load. Three-point lubrication is another feature of the units; this system allows all load bearing surfaces to be lubricated in a matter of seconds. Three-speed control permits the operator to inch the truck forward or backward smoothly and prevents starts that are too fast. Drive wheel tire changes can be made very quickly and the steel plate that secures the wheel, when removed and reversed, becomes a wheel puller, thus eliminating the need for special tools. *Automatic Transportation Co.*

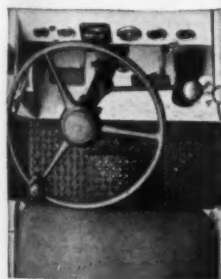
... for more details, circle No. 200 on postcard

Your Operator

"Steps Lively" and likes it

... with an Allis-Chalmers Fork Truck!

The operator of this Allis-Chalmers 6,000-lb fork truck, with rotator, handling scrap for the Aluminum Magnesium Corp., Corona, Calif., is able to "step lively" because his truck drives so easily — maneuvers so well, even in tight quarters.



Important controls are at the operator's finger tips — right where he would like to have them. Gauges are in plain sight — simple and easy to read. Floor is clear, seat can be moved forward or back to suit the operator.

Your operator moves about quickly, spots loads accurately, works relaxed all day. His output is big and steady . . . his contentment is your gain.

These are benefits of the operating ease found in Allis-Chalmers fork lift trucks. Even a green operator does the right thing almost by reflex. He could find the clutch, brake, accelerator and gear shift lever with his eyes shut, for they are positioned like those in his car. The large, 18-inch steering wheel is comfortably positioned and feels "at home" in his hands.

The seat is wide and comfortable, the floor is free of obstructions. Operator can quickly step on or off either side. There is an over-all roomy comfort that seems to stretch a day's output and shorten a day's work.

Examine one of these units at your Allis-Chalmers Materials Handling Dealer's. Ask him to show you the long-life features that keep it going at a lively pace with a minimum of maintenance. Write for free descriptive bulletin, "Put Yourself in the Driver's Seat."

MATERIAL HANDLING DEPT., BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



... for more details, circle No. 69 on Reader Service Postcard

STEEL FASTENER CLIP

... holds tension while screwing nuts



A steel fastener clip designed for sliding around the bolt of a wiring or hose clamp holds tension during the arranging and screwing of the nut. Called Clip-It, the tiny fastener can be inserted around a clamp bolt to fasten or release the clamp's prongs for repeated adjustments while arranging wiring bundles and lines on jigboards, or while fastening hose. A rectangle of punched spring steel, the clamp fastener is about the size of a man's fingernail. A slot extending halfway into the clip grips the inside thread diameter of the clamp's bolt. One end is bent upward for firm handling. Samples are available. *Pastushin Industries, Inc.*

... for more details, circle No. 201 on postcard

LATEX EMULSION

... for preparing concrete toppings

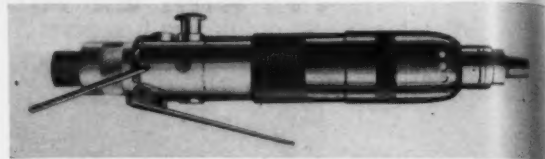
Super-Bondsit is a liquid latex emulsion which may be substituted for most of the mixing water used in cement mixtures. It is designed primarily for use in resurfacing, reconditioning, or repairing concrete surfaces. It also

provides lasting adhesion to masonry, steel, and glass. The emulsion is resistant to water, alkalis, and acid spillage and gives a non-slip, non-dusting, and spark-resistant surface that will not chip. Super-Bondsit has been successfully used for construction and maintenance of trucking aisles, loading platforms, under-layments, driveways, etc. Available in 1 or 5-gal. cans and 55-gal. drums. *A. C. Horn Co., Inc.*

... for more details, circle No. 202 on postcard

AIR POWERED SCREWDRIVER

... with a whispering exhaust

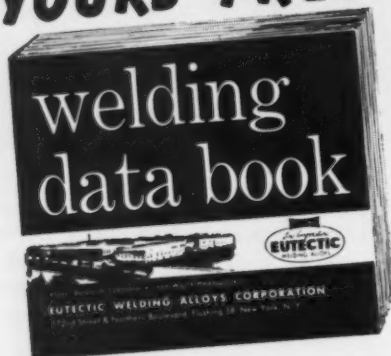


A quiet exhaust is a special feature of this air powered screwdriver. According to the manufacturer, the streamlined exhaust neither adds excess weight nor bulk to the tool and permits it to run at full rated speed and power. The screwdriver, called the Dulcetone, can be reversed instantly in operation without releasing the lever throttle. The operator pushes a button for reverse rotation, releases it for forward rotation, and uses only one hand. The button can be locked for reverse rotation if desired. These adjustable-clutch models can be pre-set to correct torque requirements, and the clutch jaws automatically disengage when the screw is set to desired tension. Screwdrivers have a nominal capacity of No. 8 free running nuts and machine screws and run at 1,800 rpm. *Aro Equipment Corp.*

... for more details, circle No. 203 on postcard

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... for your copy, circle No. 70 on Reader Service Postcard
WESTERN INDUSTRY — October 1956

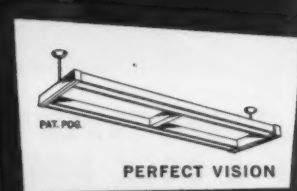
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the man
from
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No matter how difficult
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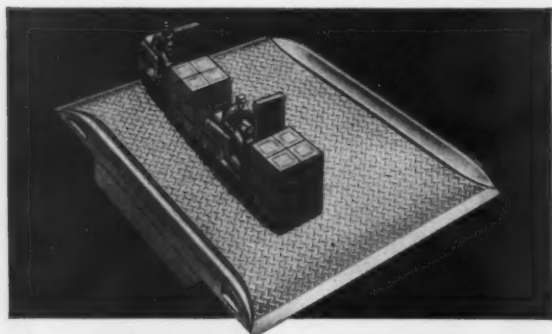
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AN **EXTRA** POWER TRUCK FOR THE PRICE OF A DOCK BOARD!

Make your power equipment produce more—back them up with Magliner magnesium dock boards!

Magliners rid your operation of bottlenecks, hazardous loading conditions ... high costs! They speed dock traffic ... give you faster loading cycles ... promote safety and efficiency. As one customer aptly put it—"It's like getting the services of a second power truck free for the price of a Magliner magnesium dock board!"

Magliner dock boards are light ... strong ... safe! Made of magnesium for easy, one-man handling, rugged dependability and economical, long-life service. Custom-engineered to meet the specific requirements of your dock, equipment and operating conditions. Need an extra power truck? Check into Magliner magnesium dock boards today.

Write today for Bulletin DB-204

MAGLINE INC.

P. O. Box 510, Pinconning, Mich.



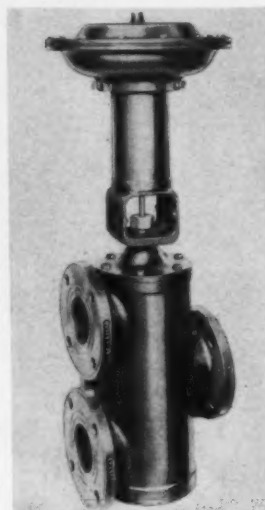
DOCK BOARDS

Canadian Factory: Magline of Canada Ltd., Renfrew, Ontario

... for more details, circle No. 73 on Reader Service Postcard

94

3-WAY BY-PASS VALVES ... with constant total capacity



These three-way by-pass valves for control of liquid flow have constant total capacity regardless of the position of the inner valve. Flow can be directed to either of two outlets as required. They are designed to be 100% tight-closing, which makes them good for diverting applications which would normally require the use of two separate valves. It is possible to change the discs and seat rings without removing the entire valve from the pipe line, while slamming and water hammer noise is eliminated by seating both discs against the flow. The valves, with molded rubber diaphragm operators, are available in 2½, 3, and 4-in. sizes. Maximum pressures range up to 250 psi. at 406 deg. F. and 400 psi. at 70 deg. F. Maximum control air pressure is 25 psi. *Johnson Service Co.*

... for more details, circle No. 204 on postcard

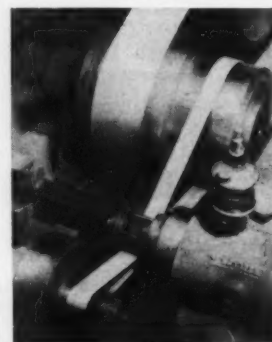
"QUICK-BILT" SHELVING ... for flexible storage arrangements



"Quick-Bilt" shelving is easily assembled and easily rearranged so it can be built to fit the user's particular storage requirements. Starting with a basic unit consisting of base shelf, top shelf, back and two end panels, the user slides in as many shelves as needed, selects the required number of dividers from four sizes offered, snaps them in place, and the unit is ready for use. Shelves can be raised or lowered even when loaded without removing dividers. *Frick-Gallagher Manufacturing Co.*

... for more details, circle No. 205 on postcard

TRANSMISSION BELT ... for high speed drives



Developed especially for very high speed drives, this flat transmission belt, called the Rusco Ultra-Speed, withstands the centrifugal forces exerted by ultra high speeds and the severe flexing action of small diameter spindles. Spindle speeds in excess of 100,000 rpm. can be maintained for extended periods over small pulleys without damaging the belt. The belt is a blend of synthetic and natural fibers and, according to the manufacturer, has excellent edge wear and does not fray. *Russell Manufacturing Co.*

... for more details, circle No. 206 on postcard

WESTERN INDUSTRY — October 1956

NEW Airco **POP** can seals out dampness...

*keeps
stainless steel
electrodes "oven fresh"
in re-usable aluminum
container — eliminates
special storage facilities!*

Airco Stainless Steel Electrodes are now packed in seamless aluminum containers. Each "POP" can contains 10 pounds of electrodes, and is sealed with a waterproof airtight industrial tape.

This hermetic electrode packaging technique is the best way to keep stainless steel electrodes "oven fresh" — without benefit of special shop or field storage equipment. Unused electrodes can be kept fresh by resealing the can.

Airco Stainless Steel Electrodes, in the "POP" can, are but one of many types in Airco's complete line that also includes hard-facing, cast iron, mild steel, general, and special purpose electrodes. Send for the free Airco Electrode Guide which will help you select the right electrode for your special job.



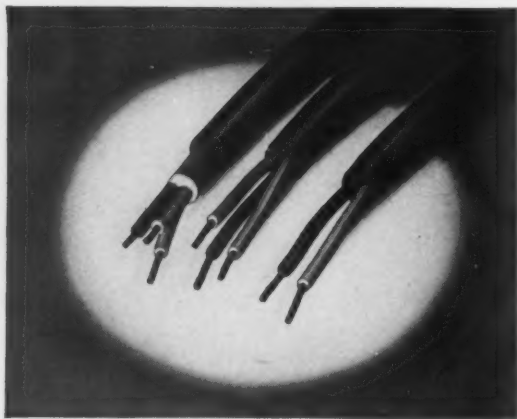
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... for more details, circle No. 74 on Reader Service Postcard



3 NEW LINES OF CORDS AVAILABLE

Now Anaconda offers a new full line of cords for each major application. You can select the *one* best suited for your needs—based on good engineering and sound economy. **SECURITYFLEX*** Cords for severest applications; **INDUSTRIAL** "all-purpose" Cords for hard usage; **SERVICE** Cords used with most appliances. All are made with typical Anaconda emphasis on quality! Call your electrical wholesaler or the man from Anaconda today. And send for Anaconda's new free bulletin: "Portable Cords." Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Reg. U. S. Pat. Off.

ANACONDA

... for more details, circle No. 75 on Reader Service Postcard

Oakite's FREE Booklet

"Some good things to
know about Metal Cleaning"

answers many questions that mean better production, more profit for you. Just look at the table of contents:

Tank cleaning methods	Zinc phosphate coatings
Machine cleaning methods	Paint-stripping
Electrocleaning steel	Steam-detergent cleaning
Electrocleaning nonferrous metals	Barrel finishing, burnishing
Pickling, deoxidizing, bright dipping	Better cleaning in hard-water areas
Pre-paint treatment in machines, in tanks and by hand	Treating water in paint spray booths
	Rust prevention
	Machining and grinding

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SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U.S. and Canada

... for your copy, circle No. 76 on Reader Service Postcard

PORTABLE FOOT WARMER

... guards against on-the-job cold feet!



Designed for use in offices and production areas, this electrically heated foot warmer is made of neoprene rubber and is easily portable. The Electro-Mat is 14 x 21 in. and requires less electric power than a 100-watt light bulb. It will operate on either a-c. or d-c. It may also be used by warehouse workers, shipping clerks, night watchmen, plant guards, machine operators—by anyone who works sitting or standing. **Interstate Rubber Products Corp.**

... for more details, circle No. 207 on postcard

ELECTRONIC-HYDRAULIC CONTROL

... solves pressure, temperature problems

This electronic-hydraulic control unit can solve control problems involving pressure, vacuum, temperature, liquid level, flow or condensate drainage and is adaptable to practically any manufacturing process. Each unit is

GAR-BRO WHEELS

FOR ALL INDUSTRIAL APPLICATIONS



26
TYPES & SIZES

WHEEL TYPES: Drop Center, Lug Base, Disc, Demountable.

WHEEL DIAMETERS: 21", 20", 18", 17", 16", 15", 12", 10", 8", 6".

BEARINGS: Tapered roller, straight roller or ball.
TIRES: Pneumatic or cushion—all standard sizes.

Available with or without tires.
Write for catalog.

GAR-BRO WHEEL COMPANY

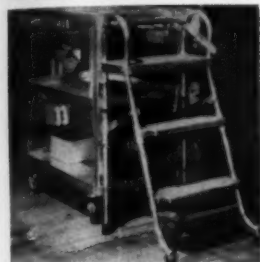
Division of Garlinghouse Bros.
2415 E. Washington Blvd., Los Angeles 21, Calif.

... for more details, circle No. 77 on Reader Service Postcard

custom-built to the customer's specifications, and is guaranteed for 30,000 hours of operation. Installation is simple and, according to the manufacturer, the unit's speed of action eliminates the problems of lag and hunting. *Arthur Towell, Inc.* . . . for more details, circle No. 208 on postcard

STOCK PICKER

... for narrow aisles, cramped quarters



This stock picker, measuring 41 x 20 in., was designed for handling packaged goods or small parts in narrow aisles and cramped quarters. A special feature is a space saving ladder that folds up close to the truck. The ladder operates by a lock lever which automatically folds the ladder when

not in use; it also has four rubber tipped feet to guard against slipping. When the operator steps on the ladder, it spreads automatically. With lock lever down the rear casters of the truck are lifted off the floor, making it safe to walk on the top shelf for stock inventory work. *Rol-Away Truck Manufacturing Co., Inc.*

... for more details, circle No. 209 on postcard

PLASTIC COATED STEEL SHEETS

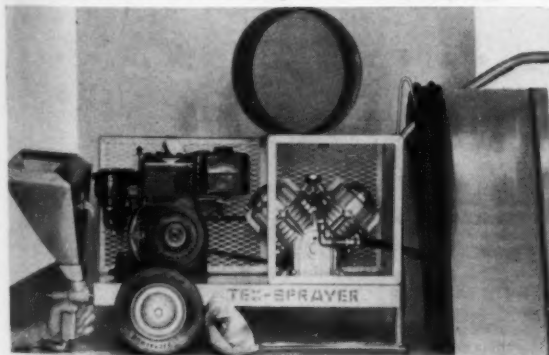
... for parts requiring protective finishes

Cold-reduced steel sheets coated with vinyl plastic are available in a limitless variety of colors and textures for use in manufacturing parts which heretofore have required protective or decorative finishing after fabrication. In the process of making these coated sheets, the steel is surface treated to improve its bonding qualities, then air cooled. It is coated with an adhesive, then the liquid vinyl, and heat treated to solidify the plastic. Sheets are available in 18 to 28-gage in widths from 24 to 52 in. *U. S. Steel Corp.*

... for more details, circle No. 210 on postcard

GUN DASHING UNIT

... adjustable for ceiling or wall spraying



Called the Tex-Sprayer, this portable gun dashing unit has a light-weight gun with stainless steel hopper and is adjustable for ceiling or wall spraying. The hopper, airjet, and nozzle are detachable for cleaning. The unit comes equipped with stainless steel airjets and three sizes of stainless steel nozzles to produce a complete range of textures and finishes. Useful for acoustical plaster, interior plaster finish, exterior stucco finish, plaster bond or cement wash finishes, the Tex-Sprayer comes with 50 ft. of air-hose. *Cyclone Sandblast Equipment.*

... for more details, circle No. 211 on postcard

TO PURCHASING AGENTS ONLY!

FREE!

Your Choice...
Evans KING SIZE 10-ft. White-Tape
(EXTRA-WIDE BLADE)
or Evans Pocket 12-ft. White-Tape
(REGULAR 1/2" WIDE BLADE)



Attention Purchasing Agents:

We make this startling offer to introduce your company to Evans' superior King-Size and Pocket White-Tapes, the finest measuring tapes manufactured.

Simply fill in the coupon below and we'll send you, absolutely free and without any obligation, your choice of either our King-Size 10-ft. (\$2.39 retail) or Pocket 12-ft. White-Tape (\$1.89 retail)! (Offer limited to one tape per purchasing agent.)

We feel that once you try Evans Tapes, you'll never buy another brand. Here's why:

EVANS KING-SIZE

10-ft. 3/4" Wide Steel Tape
Stands Up Straight for
Easy One-Man Measurements.

The 33% wider blade (full 3/4") stays straight up—will not bend when making measurements. Chrome plated zinc die-cast case. Free belt clip for handy carrying and Free Tenite Utility Case. Self-adjusting sliding hook for accurate inside-outside measuring. Also available in 6, 8, 12-ft. lengths.

All EVANS Tapes are marked so your men don't have to figure!

Work in feet and inches? Read Here
Work in inches? Read Here



EVANS 12-ft. Pocket WHITE-TAPE

Measures a full 12 feet—eliminates adding two measurements as with shorter tapes. Regular 1/2" wide blade. Chrome plated zinc die-cast case. Self-adjusting sliding hook for 100% accurate inside or outside measurements. Free transparent Tenite Utility Case.

Also available in 6, 8, and 10-ft. lengths.

All Evans tapes available with custom nameplates for gifts to your customers carrying your advertising message.

Evans RULE CO., Department 161
400 Trumbull Street, Elizabeth, N. J.

Please send me free sample of (check one)

☐ King-Size 10-ft. Steel Tape ☐ Pocket 12-ft. White-Tape
My two sources of supply for steel tapes are:

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2 _____

Name _____ Title _____

Company _____

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FOR QUICK, EFFICIENT SERVICE CALL YOUR INDUSTRIAL DISTRIBUTOR. HE IS YOUR MOST ECONOMICAL SOURCE OF SUPPLY.

... for more details, circle No. 78 on Reader Service Postcard

designed for every need
built for longer service

BRONCO INDUSTRIAL WHEELS

"with the tire that won't roll off"

General purpose, special service, spoke or disc type... no matter what your needs Bronco Industrial Wheels are designed to meet your requirements. Only with Bronco do you get tough, lightweight, aluminum construction with rubber tires molded on by Bronco's exclusive bonding process.



Easy to handle Bronco carloading or truck ramps will speed up loading and reduce handling costs. The exclusive "Underside Design" of Bronco ramps provides greater strength, longer life, minimum weight and a low initial cost.



BRONCO magnesium BRIDGE RAMPS



Write today for
your illustrated
brochure on
Bronco Industrial
Wheels or Bronco Ramps

BRONCO PRODUCTS CO. 717 Stanford Ave. Los Angeles 21, Calif.
... for more details, circle No. 79 on Reader Service Postcard

Your Attention, Please!

We of STATE INDUSTRIES, INC., proudly announce the addition of a new 36 inch Coil-Slitter to our existing facilities.

The new splitter, along with a complete inventory of coil stock in gauges ranging from 22 ga. to 14 ga. in both lustré and dull finishes puts us in a position to quote you on your needs for slit steel coils.

Our policy of prompt and courteous service will continue to be maintained as in the past.



STATE INDUSTRIES, Inc.

4019 Medford Street, Los Angeles 63, Calif. Angelus 9-9411

... for more details, circle No. 80 on Reader Service Postcard

98

VALVE RESEATING GRINDER

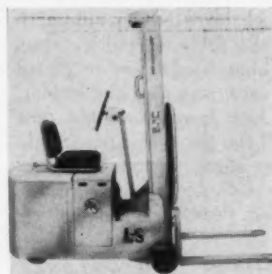
... regrinds all sizes without removal from line

This motor driven valve reseating grinder can regrind any globe or gate valve from 1/4 to 12 in. while the valve remains in the line. It will handle any valve regardless of material hardness. Grinding elements made in the form of cones and segments are mounted on various sized rubber coated grinding heads. By changing the grinding heads, the same machine can be used on different sized valves. Grinder is available in kit form in three basic models for globe and gate valves. *Leavitt Machine Co.*

... for more details, circle No. 212 on postcard

ELECTRIC FORK TRUCK

... with turning radius of 56 in.



A turning radius of 56 1/4 in. is a special feature of this electric fork truck, the Model JFTT-2.5. It will right angle stack 48 in. long loads in aisles only 9 ft., 3 in. wide. An I-beam mast with standard collapsed heights of 68 and 83 in. gives lift heights of 97 and 127 in. and free lift heights of 49 and 64 in. respectively.

The truck uses a 24-v. electrical system. Traction speeds are 4.5 to 5 mph. Total weight of the unit is 4,300 lb. with battery, so the truck can work in and out of trailer trucks, elevators, etc. *Lewis-Shepard Products, Inc.*

... for more details, circle No. 213 on postcard

SNUG and SECURE

We might modestly say we've even improved upon nature's methods of protection. We present



STEEL STORAGE CABINETS

Construction of heavy gauge steel — reinforced for lifetime service

Workmanship is the finest — making the unit an enhancement for any office

Attractive baked-on enamel finish provides a most pleasing appearance

Cabinets furnished in either storage, wardrobe or combination models

Available for quick delivery from local stocks.

OTHER BERGER PRODUCTS:

Steel shelving, tool room equipment, files, office desks, tables, work benches, shop desks.



Representatives:
BERGER MFG. DIVISION
REPUBLIC STEEL CORPORATION

899-73rd Ave. Oakland 21, Calif.
Telephone: TRinidad 2-7621

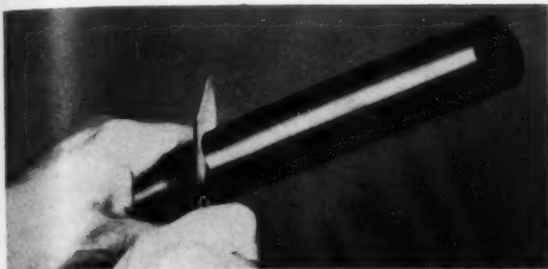
5424 E. Slauson Ave., Los Angeles 22, Calif.
Telephone: RAYmond 3-3327

... for more details, circle No. 81 on Reader Service Postcard

WESTERN INDUSTRY — October 1956

FLEXIBLE PLASTIC PIPE

... easy and quick to install



This non-toxic, pressure-proved, general-purpose flexible plastic pipe for piping water and other fluids is easily and quickly installed. Its light weight and flexibility save considerable time in installing pumps, underground water distribution lines, and industrial piping systems handling water or corrosive solutions at normal temperatures, according to the manufacturer. Pipe has a smooth bore, which reduces resistance to flow and permits a pump to deliver a greater rate of flow at the well-head or through the distribution system. Made of virgin polyethylene, the pipe is packaged in long coiled lengths and is resistant to acids, alkalies and other corrosive chemicals, and is not subject to electrolytic corrosion. *American Hard Rubber Co.*

... for more details, circle No. 214 on postcard

RUST PREVENTIVE BASE

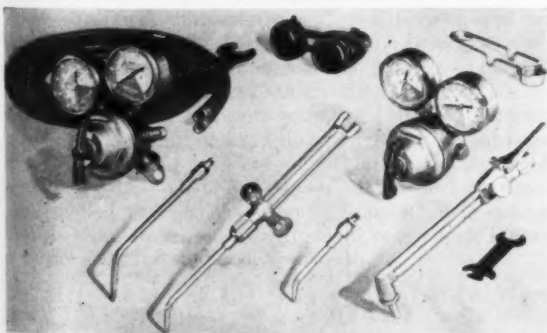
... can be mixed with water, oil, solvent

A multi-purpose rust preventive base can be mixed with water, solvent, or oil. Called Rust Veto M.P., the water displacing base has many uses for indoor protection. When mixed with water it provides a safe, non-flammable emulsion with high stability and good protection value. It can be used to replace dangerous solvents in flammable slushes also. *E. F. Houghton & Co.*

... for more details, circle No. 215 on postcard

TWO WELDING OUTFITS

... with blowpipe, cutting attachment



Two new welding and cutting outfits for production welding and limited cutting of light gage metals include the Purox W-200 welding blowpipe and the CW-200 cutting attachment. One unit has been designated the Purox aircraft welding and cutting outfit (above), the other the light welding and cutting outfit. Nine head sizes are available for use with the W-200 to weld from 32 gage to 3/8-in. thicknesses, while three nozzles for the cutting attachment cut iron and steel up to 2 in. thick. Three welding heads and one cutting nozzle are included in each outfit. *Linde Air Products Co.*

... for more details, circle No. 216 on postcard

New, lightweight
VICTOR
Duplicutter
MODEL DC-2000

Portable Model DC-2000 cuts circles to 19 1/2" diameter, rectangles to 12" x 35", and metals to 8" thick. Torch accommodates all Victor 1-101 and 1-100 cutting tips, through size 5.

**Flame cuts parts accurately,
saves handling and set-up time,
increases labor efficiency.**

This portable VICTOR DUPLICUTTER weighs only 36 pounds. Operator easily carries it to any work location in plant, field or warehouse... thus saving you time and cost of moving materials. Set-up takes minutes only. You lose no time leveling DUPLICUTTER—its magnetized feet use stock being cut as working base. And it's so simple one man easily handles production from 2 or 3 DUPLICUTTERS.

Precise controls and powerful, permanent magnet in template follower enable you to duplicate parts to production tolerances of plus or minus 1/64". Easy, quick interchange of templates makes DUPLICUTTER practical for both long production runs or duplication of single part.

Why not see for yourself how easily the VICTOR DUPLICUTTER handles, how fast and accurately it cuts? Call your VICTOR dealer NOW and ask him for a demonstration on your job... or write us for descriptive Bulletin 353.



For maximum efficiency and safety,
use genuine Victor tips and parts

30

—VICTOR EQUIPMENT COMPANY—

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

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San Francisco 7

3821 Santa Fe Avenue
Los Angeles 58

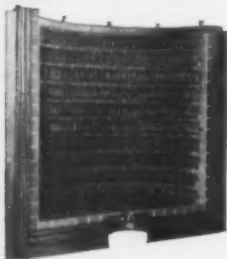
... for more details, circle No. 82 on Reader Service Postcard

POSITIVE TEMPERATURE CONTROL—No Over-Heat!

TRENT "HIGH-TEMPERATURE" JACKETS

with TRENT "Folded-and-Formed" Heating Units

Only TRENT "Folded-and-Formed" ribbon type resistor heating element provides controlled, uniform radiant heat up to 2000°F. ... the greatest radiating surface per square inch of element cross section of any electrical heating element! And only TRENT Heating Jackets offer these design advantages to assure efficient processing operations wherever high-temperature radiant heat with positive control is essential.



- Temperatures to 2000°F. without Pressure Equipment
- Maximum Heat Input
- "Double-Boiler" type Unit and Chamber Control
- Heat Zone Control—either Manual or Automatic
- Brick Insulation or Appropriate Low Temperature Insulation Depending on Operating Requirements
- All-Welded Internal Connections
- Rapid Heat Decline after Unit is De-energized
- Maximum Element and Jacket Life—Minimum Maintenance

Let an experienced Trent Heating Engineer show you how Trent "High-Temperature" Jackets with Trent "Folded-and-Formed" Heating Units can mean trouble-free controlled heat for the kettles, tanks, autoclaves and similar process vessels you use or design. Or write for Bulletin 72-E.

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Coast to Coast

TRENT INC.

Electrically Heated Industrial Equipment
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In Canada: Supreme Power Supplies Limited, Toronto, 14

... for more details, circle No. 83 on Reader Service Postcard

5

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Ball &
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serving
the Southwest
since
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EDWARD D. MALTBY CO.

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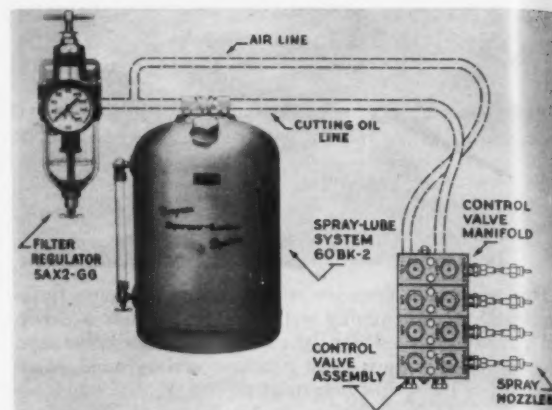
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PHOENIX
424 W. JEFFERSON AVE. 2041 W. ANAHEIM

... for more details, circle No. 84 on Reader Service Postcard

100

SPRAY-LUBE SYSTEM

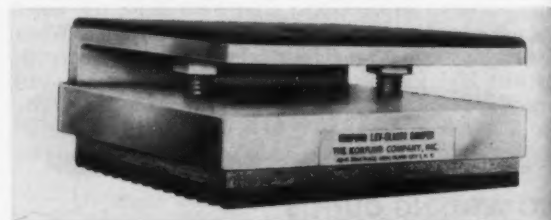
... for application of cutting oils



This spray-lube system is designed to apply a uniform spray of cutting oil directly upon the close interfaces between tool and work piece. It can be directed from the underside of the curled chip or from any other angle. Oil spray is produced within the nozzle itself by means of a tube within a tube, which results in a spray that is consistently uniform in quality. Average unit occupies a space of 14 x 20 x 7 in. with a 2-gal. liquid reservoir. C. A. Norgren Co. ... for more details, circle No. 217 on postcard

MACHINE MOUNT

... for installation of any equipment



Lev-Elasto damper is a low cost machinery mount that can be used when installing or relocating all types of equipment to stop vibration transmission and lower noise levels. The damper will accommodate all job conditions without job site alterations. The mount has internal leveling adjustment that permits installation anywhere under the machine regardless of position of bolt holes in the base or the base thickness. No bolting of the machine to the mounting is necessary because the mount has a non-skid felt pad on the top plate; mounting can be cemented or bolted if desired. Damper is available in nine sizes. Korfund Co., Inc.

... for more details, circle No. 218 on postcard

✓ check

the many advantages of

**SORBOCAST
CAST IRON
DAYTON FOUNDRY**

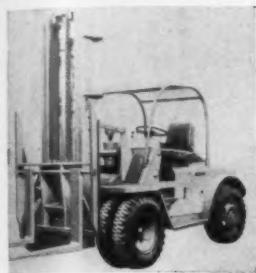
Hollydale, Calif. • NEvada 6-1251

... for more details, circle No. 85 on Reader Service Postcard

WESTERN INDUSTRY — October 1956

HEAVY-DUTY TRUCK

... with wide front and back axle



This heavy-duty fork lift truck with wide axle front and back is available in six capacities: 12,000, 14,000, 16,000, 18,000, 20,000, and 22,000 lb. Tracking wheels—rear steer wheels aligned with front drive wheels—help minimize drag in areas where adverse ground conditions prevail. All six wheels are standard 20-in. truck wheels, using standard pneumatic truck tires. A 160-hp. Ford V-8 industrial overhead valve engine supplies power. *Gerlinger Carrier Co.*

... for more details, circle No. 219 on postcard

PANELBOARD

... with quick-make-break switch units

This heavy duty power distribution panelboard with rigidly mounted fusible switch units of the quick-make, quick-break type is designed for 600-volt a-c. maximum service, two or three wire, single-phase and three or four wire, three-phase applications. Called the Type QMR, it can be operated in systems having short-circuit capacities up to 100,000 amperes rms. asymmetrical when current limiting fuses are used. Fusible switching devices are individually enclosed in a protective steel compartment; an interlocked cover can be opened only when its handle is in the "Off" position. *General Electric Co.*

... for more details, circle No. 220 on postcard

AIRTUBE SYSTEM

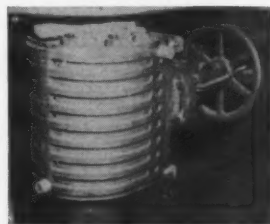
... in kit form for easy installation

This prefabricated, two-station pneumatic airtube system comes in kit form and can be installed in any type of building by regular maintenance personnel. It has been designed specifically to bring the benefits of the pneumatic tube system within reach of small business pocketbooks. The complete kit assembles into a two-way system connecting points up to 250 ft. apart. Messages are moved through the tubes in air propelled carriers at 20 ft. per sec. Carriers may be sent as often as one every 10 sec. Included in the kit are tubing, bands, valves, chutes, message carriers and a cabinet unit containing a 1/2-hp. motor and exhaustor to create the airstream. *Puro Filter Corp. of America*

... for more details, circle No. 221 on postcard

CLAMP-ON WARMER

... for 4 to 10-in. valves



This clamp-on type valve warmer is made of two sheets of metal and designed to warm valves from 4 to 10 in. The outside sheet is embossed to create flow channels while the inside sheet is flat. The two sheets are welded together and then curved to fit the valve.

Flat inside sheet assures close contact with valve and heat transmission. *Thermos-Panel Coil Division, Dean Products, Inc.*

... for more details, circle No. 222 on postcard

FASTER DELIVERY

(FROM NUTTING WEST COAST WAREHOUSE)



OVERNIGHT DELIVERY to most areas of the most popular models and sizes of Nutting Floor Trucks, Casters and Wheels.

FACTORY CARLOAD SHIPMENTS at regular intervals reduce your freight expense and provide adequate replacement of stock items.

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YOUR NEAREST

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Phone: CAPITOL 8-2321

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Secord Sales Company
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Phone: MAIN 0737

TUCSON
L. J. Clarke & Company
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NUTTING TRUCK AND CASTER COMPANY

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... for your copy, circle No. 86

... for more details, circle No. 87 on Reader Service Postcard

WESTERN INDUSTRY — October 1956

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PRESSURE VESSEL FOR AEROJET-GENERAL CORPORATION

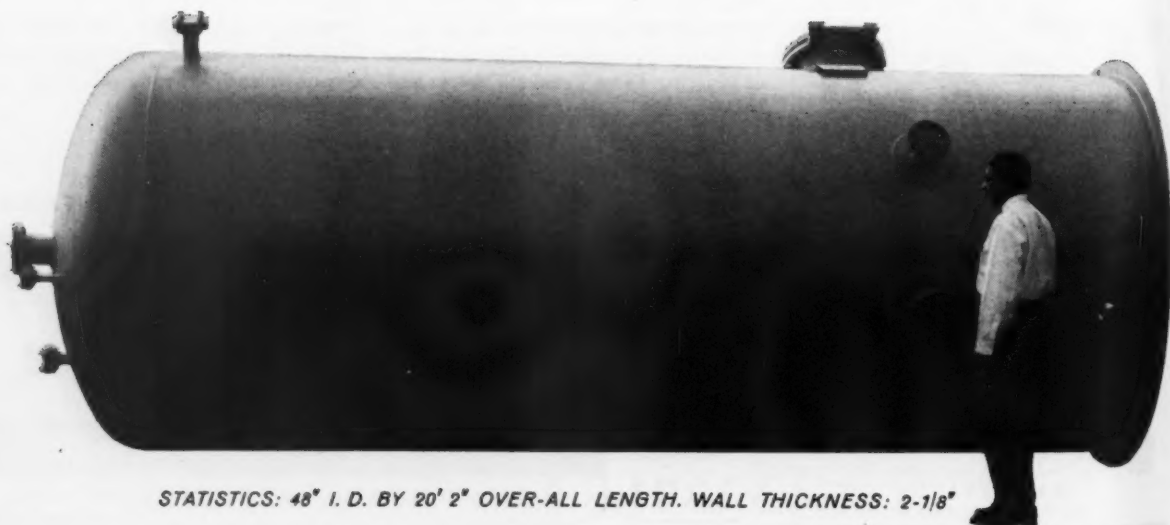
DESIGNED BY THE ARCHITECT-ENGINEER DIVISION OF
AEROJET-GENERAL CORPORATION

FABRICATED BY

Kaiser Steel
Fabricating Division

NAPA AND FONTANA, CALIFORNIA

BUILT TO SERVE THE WEST...THROUGH PRECISION STEEL FABRICATION



STATISTICS: 48" I. D. BY 20' 2" OVER-ALL LENGTH. WALL THICKNESS: 2-1/8"

... for more details, circle No. 88 on Reader Service Postcard
WESTERN INDUSTRY — October 1956



THE INDUSTRIAL WEST ON ITS WAY

plants • production • distribution • personnel

GUIDELINES

- **TEMPORARY LUMBER MILL SHUTDOWNS IN THE NORTHWEST** are reportedly caused by a need to balance supply with demand. Lumber and plywood prices are slightly weakened by over-production, say some industry experts.

And the lumber industry grows in Utah: Current production is about 75,000,000 bd. ft. per year, a 50,000,000 increase over 1945 output. **Commercial forest lands have doubled** in area since 1945, due largely to more and better roads into forest regions. New uses for previously unused timber accounts for much of the growth.

\$20,000,000 PULP MILL IS UNDER CONSIDERATION IN BRITISH COLUMBIA by an unidentified group of Canadian forest-industry organizations. Plant would probably be built in Northeastern region near Peace River.

- **LOW-COST NUCLEAR REACTORS ARE PRACTICAL NEW TOOL FOR INDUSTRY:** Latest developments in nuclear reactors place them within reach as **power and test units for plants and laboratories**. North American Aviation compares its small atomic unit to the Model T Ford, calling the **one-operator, \$55,000 unit** a door-opener to further development. A cylindrical 8 x 8-ft. package, it can be installed and operating in 6 months time in almost any location.

Mass-production lowering of reactor costs has led to Aerojet-General Nucleonic's filing of application for AEC permit to turn out **three more of its \$100,000 units**, bringing total contracts to four. New homogeneous polyethylene moderated core producing facilities at San Ramon, Calif., plant are key to cost reduction on this unit. For more reactor details **see equipment review on page 88**.

- **FIRST PLANT BUILT FOR ALL JET AIRLINER PRODUCTION** in the entire nation is underway in Long Beach, Calif. It's Douglas Aircraft's DC8 (four-engine commercial jet) plant scheduled for completion next spring. First DC 8 should be in service in 1958.
- **WESTERN INDUSTRIAL PARKS MAKE ROOM FOR MORE PLANTS:** Sunnyvale, Calif.'s industrial boom has given birth to plans for development of a **new 133-acre industrial tract** to supplement demand for space in existing over 2,000-acre "park." **Berkeley, Calif.'s special industrial district** jumped from idea to reality when approval for reclassification of about 18 sq. blocks was received recently. New zoning will permit entry of more manufacturing concerns. Another rezoning action was given the "green light" by Sacramento, Calif. Board of Supervisors and will probably result in another industrial center on property (now farm sites) near Mather AFB.
- **YALE & TOWNE WESTERN PLANT RUMOR BECAME FACT** when the company got construction underway on a \$1,000,000, 400-employee **lift truck plant in San Leandro, Calif.** Start-production date is set for early 1957.
- **ANOTHER TAP ON THE SAN JUAN GAS BASIN** will take place when Southwestern Engineering completes (in October 1957) construction of an **\$8 to \$10,000,000 natural gas products refinery** for El Paso Natural Gas Products Co. in Northern New Mexico.

With an initial capacity of 7,000 bbl. per day, and provisions for top production expansion to 13,000 bbl., the plant will serve New Mexico, and parts of Arizona, Colorado and Utah.

— News details on following pages —



LIFT TRUCKS WILL BE MANUFACTURED in this new \$1,000,000 Yale & Towne plant in San Leandro, Calif., upon construction completion in early 1957. Plant will employ about 400 people.

Yale & Towne Western plant underway



W. J. Stroud

Construction started last month in San Leandro, Calif., on a lift truck manufacturing plant for Yale & Towne Manufacturing Co. Cost of the plant and the site were estimated at about \$1,000,000.

Completion of the plant, expected early in 1957, will enable the firm to better serve materials handling needs of industries located West of the Rocky Mountains. The factory will have more than 100,000 sq. ft. of floor area and will be constructed of steel framing and concrete walls with brick facing.

The new factory is part of a program for Western sales and service expansion, which also includes the opening of an industrial lift truck sales and service sub-branch to be headed by W. J. Stroud, in Fresno, Calif.

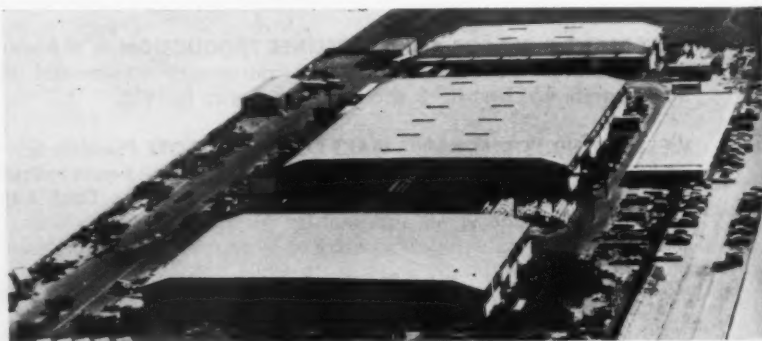
Daystrom subsidiaries expand in Los Angeles

Two subsidiaries of Daystrom, Inc., are expanding operations in Los Angeles. Daystrom Pacific Corp. late last month broke ground for its million dollar office-research-manufacturing plant in the Westchester section of Los

Angeles, while Weston Electrical Instrument Corp. opened a Los Angeles area branch office.

Daystrom Pacific, with its American Gyro division, plans to move into its new facilities in February 1957. A 50,000-sq. ft. building will have space for offices and production activities which will employ about 50 people, while a separate building will house the environmental laboratory and maintenance shop.

Weston's Los Angeles facility is its first in that area. Operations of the branch headquarters will include instrument field service, a complete instrument repair department, prototype modification service, instrument sales and application engineering, and maintenance of instrument stocks for quick delivery in the area.



NEW DESIGN FEATURES for trailers are going into production in this new Utility Trailer plant in Puente, Calif. Covering 34 acres of land, the plant cost \$1,000,000.

Instrument representative expands in Portland

The James L. Kearns Co. of Portland, Ore., has added several hundred square feet of office and storage space to its sales and storage facility. Added area provides more space for storage and offices and a more effective shipping entrance.

Applied Electronics completes South San Francisco plant

Applied Electronics Co., Inc., manufacturer of industrial communications equipment, has completed its new plant in South San Francisco. The plant, with 22,000 sq. ft. of space, is arranged, tooled, and equipped to provide expanded production of electronics products, particularly radio telephones.

New facilities include a laboratory to augment current engineering and new product development, offices, and warehouse space.

\$1,000,000 plant opened by Utility Trailer in Puente

Utility Trailer Manufacturing Co. has opened its new million dollar trailer plant in Puente, Calif. The large manufacturing unit covers 34 acres of land.

According to John Bennett, president of Utility, the new center will enable the firm to put into production new design features it has developed for trailers. Lack of space and equipment have held down production in the past.

THE INDUSTRIAL WEST ON ITS WAY

is a special monthly feature of . . .



. . . serving plant operating executives
in the nation's fastest growing region.

609 Mission St., San Francisco 5, Calif.



it takes co-operation
to make any goal!

Western industry knows that goals in sales and profits in populous markets East of the Mississippi are reached faster via National Carloading. So, too, supplies from the East are delivered swiftly, on schedule, through the expediting procedures that National has set up to serve the West... procedures and routing that often save a full business day in delivery cross-country. There is co-operation, also, in the co-ordination of National's network of more than 150 stations serving 30,000 communities. The one-call, one-

responsibility, one-invoice service...the ability to trace shipments or to re-route or re-consign them, when necessary...is the essence of National's service. It's the kind of co-operation that will assist your operation...help you achieve new and higher goals in production, in sales, in profits! Try National on your next East-bound LCL deliveries. Always specify SHIP VIA NATIONAL CARLOADING CORPORATION...on your orders to Eastern suppliers. It's "The Best Way"... the golden way to any goal!

FREE! Request that "National News" be sent you monthly. It's the publication of National Carloading Corporation designed to keep you aware of late developments in cross-country business and transportation. A note on your letterhead will bring it to you.

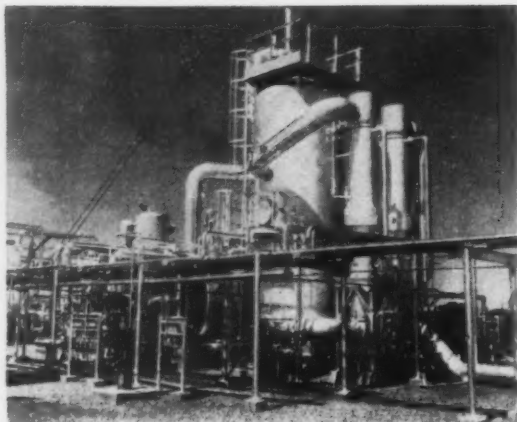


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District Office: 6625 White-Henry-Stuart Bldg., Seattle, Wash., Mutual 1490
District Office: 245 California St., San Francisco, Cal., Garfield 1-6279

... for more details, circle No. 89 on Reader Service Postcard

New and expanded Western refining units go on-stream



HIGH-GRADE SULPHUR is being produced at the rate of 40-long tons daily at Montana Sulphur & Chemical Co.'s new Billings, Mont., plant. Firm also erected a hydrogen sulphide recovery plant.



FIRST UNIT IN CURRENT EXPANSION PROGRAM was completed by Tidewater Oil Co. at Associated Calif. It's a 24,000-bbl. hydrosulfurizer. Program calls for 30% boost in gasoline output.

El Paso Natural Gas awards New Mexico refinery contracts

El Paso Natural Gas Products Co. has awarded a contract for the design and construction of an \$8-to-\$10,000,000 refinery to be located a few miles east of Gallup, N. Mex. Southwestern Engineering Co. of Los Angeles, will handle the project, which, when completed, will have a capacity of 7,000 bbl./d. with a provision for an ultimate of 13,000 bbl./d.

Refinery components will include a fluid catalytic cracker, alkylation plant and a platformer. The refinery, which will be the first major installation of its type in northwest New Mexico, is scheduled for completion in October 1957.

Manville breaks ground for \$12,000,000 plant

Ground has been broken for the Johns Manville Co.'s \$12,000,000 board plant north of Klamath Falls, Ore. The plant, which will use lodge pole and jack pine from southern Oregon, should be completed in 1958.

The plant is located on the Williamson River on the Klamath Indian reservation.

New San Francisco engineering consultant

Paul Rosenthal, former chief project engineer with General Conveyor Corp. in San Francisco, is now offering services as a mechanical engineer-

ing consultant. New offices of the consultant firm are at 599 Front St. in San Francisco. This location is in view of a consolidation of consulting services with his father, Hyman R. Rosenthal, well-known structural engineering consultant.

The younger Rosenthal offers services in design of special process machinery, plant layout and materials handling schemes, and application of automatic controls to industrial processes. He has done some pioneer design in the latter field, primarily on controls for continuous weighing and processing in the gypsum industry.

Ziegler Steel opens second L. A. warehouse

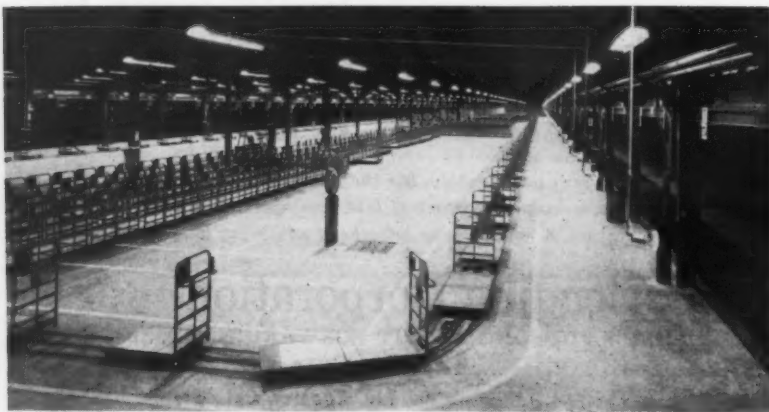
Ziegler Steel Service Corp. has opened its second Los Angeles steel warehouse in North Hollywood. The warehouse is the firm's third in California; the other is located in Oakland. Charles C. Adler has been appointed branch manager.

Flintkote Co. purchases U. S. Lime Products Corp.

Flintkote Co. has purchased United States Lime Products Corp. of Los Angeles, buying 98% of its stock for an undisclosed amount of money. U. S. Lime will be operated as a division of Flintkote.

The purchase falls under Flintkote's \$20,000,000 program of expansion and diversification. With the purchase came U. S. Lime's quarries in Nevada, California and Arizona, crushing plants and facilities for manufacturing lime products.

In-floor system speeds handling for new PIE terminal



1,400-FT. TOWVEYOR SYSTEM at Pacific Intermountain Express's new Los Angeles freight terminal circles 225 pallet sized carts at about 5 mph. to speed up delivery service.

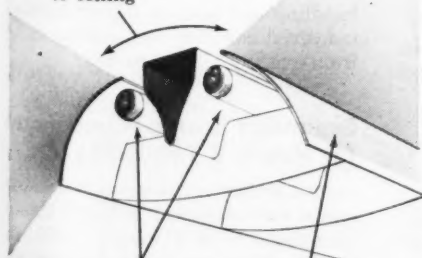


New type "slotted" fixtures at Redwood City plant of Dura-Vent Corporation, makers of high quality gas furnace vents.

Better light from new "slotted" fixtures

The "new look" in lighting fixtures

Slots direct light to ceiling



Lamps are spaced farther apart Ample shielding reduces glare

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ELECTRICAL BUREAU**

Newest look in industrial lighting is the "slotted" fixture.

Open at the top, the new fixtures direct some light toward the ceiling. Reflected off the ceiling, this light softens "glare," lightens shadows — *balancing* light over the entire area.

The new slotted design also improves air circulation around the lamps and over reflector surfaces. Tests prove this "chimney effect" reduces dirt and dust... helps keep light output high.

Free! More facts on industrial lighting!

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TAPECOAT is made as a coal tar or an asphalt coating in handy rolls of 2", 3", 4", 6", 18" and 24" widths. It is easy to apply, using a torch to soften or bleed the pitch, and then wrapped spirally around the vulnerable surface.

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Dual-purpose barge hits West Coast waters



TWO UNRELATED PRODUCTS will be transported to West Coast ports by the "Pacific No. 1," built by Kaiser in Alameda, Calif. Petroleum products will fill its holds on trips north while lumber from Northwestern mills will be carried on deck during southbound journeys.

Color Television moves for expanded facilities

Color Television, Inc., has moved from its offices and plant in San Carlos to new quarters in Belmont, Calif. In the move the company gains 19,700 sq. ft. of floor space for a total of 30,100 sq. ft.

Color Television produces automatic electronic test equipment for the electronic manufacturing and missile industries.

Dow Chemical to begin latex operations soon

Dow Chemical Co. has announced that its latex department, being built in Pittsburg, Calif., should be in operation by November. Construction began early this year on the \$2,500,000 facility.

The unit will manufacture styrene-butadiene latexes which are used in producing paints, coated papers, and other materials.

New building houses two Weber divisions

The electronics division and commercial division of Weber Aircraft Corp. have both moved into a new building adjacent to the company's headquarters in Burbank, Calif.

The electronics division needed more space to produce an analog computer and for expansion; plans call for production of amplifiers, oscillographs and other instruments.

The new building will house the electronics division's offices, engineering and drafting departments, experimental facilities, and manufacturing and assembly departments. It will also accommodate the commercial division's offices, engineering department, prototype and assembly facilities.

Tube-Strut consolidates in new plant, office

A consolidation move from three Los Angeles locations to one fabricating plant and adjacent office building has been completed by the Tube-Strut division of Tubular Structures Corp. of America. The company has five times more plant, warehouse, office and yard space.

Tube-Strut distributes and sells a universal clamp used by materials handling and storage departments of industrial concerns to assemble racks from existing pipe or tubing.

Expansion program underway for Hewitt & Faust Mfg. Co.

An extensive expansion program is under way at Hewitt & Faust Manufacturing Co. of El Cajon, Calif., in the San Diego area. The firm has recently completed an addition to its main plant and broken ground for a new building.

The plant addition adds about 8,000 sq. ft. of space and permits installation of new equipment and a re-planning of floor area. The new building will be

adjacent to the main plant and should be completed about the middle of November.

Hewitt & Faust supplies specialized tooling, jig and precision sheet metal components to aircraft manufacturers and other firms needing high pressure machining work.

\$20,000,000 all-jet plant underway for Douglas

The nation's first plant devoted entirely to the manufacture of commercial jet airliners is underway in Long Beach, Calif. Douglas Aircraft Co. has started work on its \$20,000,000 plant to make four-engine DC8's with the first plane scheduled to take off in 1958.

The plant will have two large hangar-type buildings and three smaller service structures, all totaling 1,000,000 sq. ft. of floor space. The main structures, both 1,144 ft. long, will be known as the structures assembly building and the final assembly building. Smaller buildings will house shops, offices, drafting rooms, lunchroom and restrooms. None of the buildings will have windows.

Sierra Electronic to build new Menlo Park facilities

Sierra Electronic Corp., San Carlos electronics research and instrument manufacturing firm, has announced plans to build new facilities in Menlo Park, Calif. The initial unit of the new plant will be a 35,000-sq. ft. building on a 2½-acre site in the Bohannon Industrial Park. An additional 2½ acres has been set aside for expansion.

All operations of the firm, including engineering, manufacture and administration, will be installed in the new building by the end of 1956. The plant will include enlarged facilities for development engineering, as well as production, machining, sheet metal and paint shops.

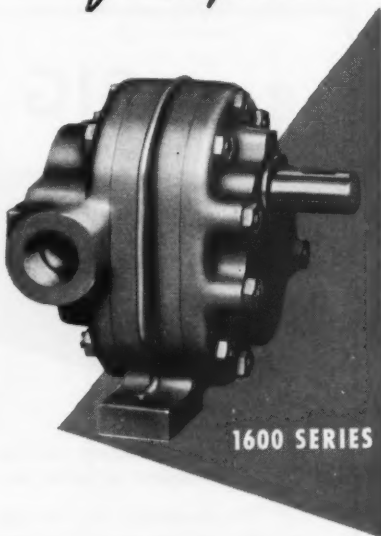
Harvey forms aluminum structural division

Harvey Machine Co., Inc., of Torrance, Calif., has formed a new division to engineer, fabricate, and erect aluminum structures. Appointed to organize the division is *Dr. J. Morley English*, a structures authority on leave from the University of California at Los Angeles.

The structures division will have headquarters at the Harvey plant near Los Angeles and will use the metallurgical, production, and fabrication facilities of the parent firm.



The new **ROPER** **HYDRAULIC PUMP-MOTOR** *for Improved* **INDUSTRIAL SERVICE**



Designed by the same engineers who developed the famous Roper Rotary Pumps, the new Roper Hydraulic Pump-Motors operate on the same principle using two equal size, smooth-running gears in a precision-fitted case. These units offer low-speed and high-torque (much needed in the hydraulic field), and their versatility finds them well-suited to heavy-duty service within their operating range. They run equally well in either direction both as pumps or motors . . . they can be direct-connected without speed reducers, thus conserving space . . . they are easily installed, easy to operate, and are long on economy. Perhaps *you* have equipment that can be further improved with a Roper Hydraulic Pump-Motor. Send for all the facts today.

PERFORMANCE CHARACTERISTICS

Available in foot and flange mounted models. Recommended speed range on larger sizes is from 200 to 800 RPM with pressures to 800 PSI. In this range, Roper units require from 7 to 40 GPM flow and will develop up to 11.5 HP output at maximum speed and pressure. Smaller sizes may be operated up to 1200 RPM and up to 800 PSI which will require a flow of 16 GPM to develop up to 5 HP.

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Pacific Coast Office, Pump Division, 2011 S. Santa Fe Ave., Los Angeles 21, Cal.

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Rotary Pumps

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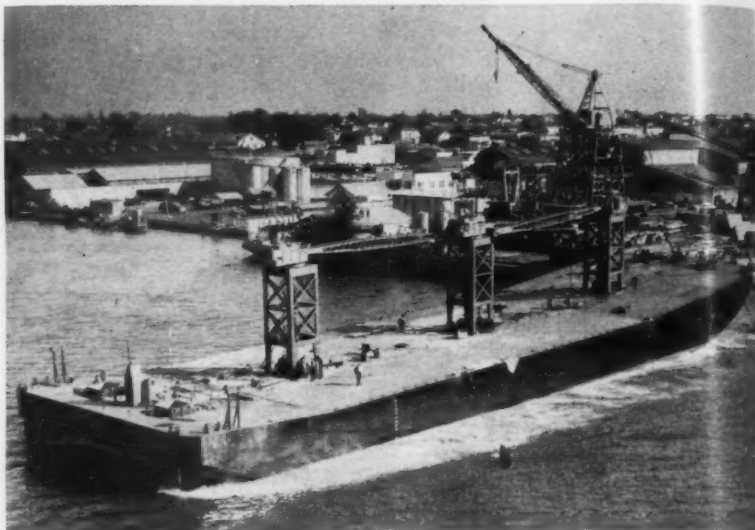
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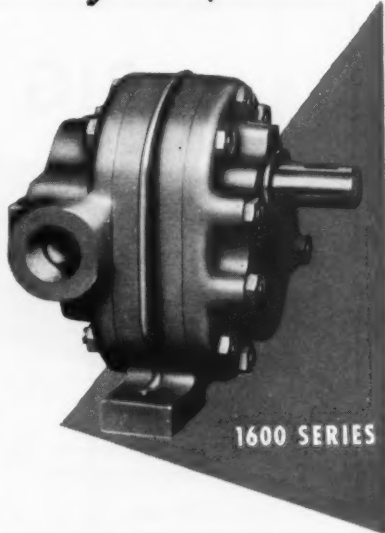
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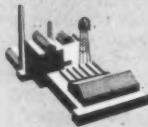


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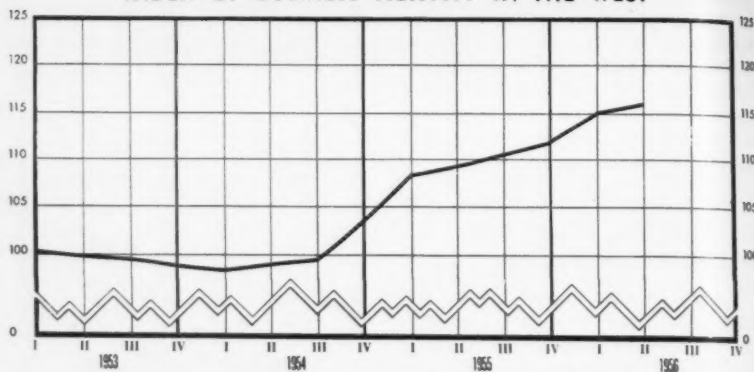
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INDEX OF BUSINESS ACTIVITY IN THE WEST



WESTERN BUSINESS INDEX AT HIGHEST LEVEL since very slight dip in first quarter of 1954. The seasonally adjusted data compiled by Prudential Insurance reveals that dampening factors during the past quarter were: reduced number of non-farm mortgages recorded, lower production of electrical energy, a slight dip in retail trade volume and a dip in lumber production.

Pack River operates plant around the clock

Pack River Tree Farm Products, Spokane, is operating its new plant at Sandpoint, Ida., on a 24 hours a day, seven days a week basis. The plant makes Tenex interior wafer panels.

According to *Wayne Long*, plant manager, the plant has been engaged in a long period of test runs because most of the equipment was designed and built for the Tenex process.

Wall-Western division merges with Great Western

The industrial chemical division of Wall-Western, Inc., has merged with Great Western Chemical Co. of Oregon. Both Portland companies, which are sales agents and distributors of agricultural and industrial chemicals and raw materials, will operate under the name of Great Western Chemical Co.

F. Allen Wall, president of Wall-

BIG HOSE



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36 inch by 20 foot
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See Goodyear, too, for seaload hose, oil suction and discharge hose up to 12 inches in diameter and 50 feet in length.

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Western. will serve as executive vice president of the expanded organization. Other principals will remain the same. The industrial and mill supply division of Wall-Western was not involved in the merger.

New plant, more orders for mass-produced reactors

Aerojet-General Nucleonics has moved from its quarters in Walnut Creek to San Ramon, Calif., and announced plans for an eventual expansion to 75,000 sq. ft. New facilities include administration and sales offices, engineering, design, and research laboratories, and a production area for mass producing reactors.

In conjunction with its move, Aerojet-General Nucleonics also announced that it has filed applications with the AEC for construction permits to produce three additional portable research and training reactors. AGN is already producing a small portable reactor.

Eastern rope firm to build in Salem

Plymouth Cordage Co. of Plymouth, Mass., has bought 91½ acres of land in Salem, Ore., for a branch factory. The purchase is the result of a survey made a year ago of the entire northwest region in an attempt to find a location for a branch factory.

Plymouth Cordage has not revealed any details about the size of its proposed branch or the number of workers it will employ. The construction date has not been decided either.

Lear opens laboratory for instrument development

Lear, Inc., has opened a research and development laboratory adjoining its other facilities in Santa Monica, Calif., to house the West Coast engineering branch of its Grand Rapids, Mich., division.

The laboratory will be devoted at least in part to instrument development. Immediate plans call for work in machine tool automation, damper system design for fighters, and new projects in drone and missile controls.

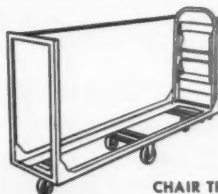
Black & Decker opens branch in Phoenix

A sales and service branch has been opened by Black & Decker Manufacturing Co. in Phoenix, Ariz., to furnish repair and service facilities for the firm's portable electric tools in that area. Barry R. Agenbroad, who has worked in the Los Angeles branch, has

UTILITY TRUCK



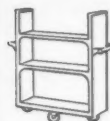
CHAIR TRUCK



COMMERCIAL and INSTITUTIONAL Equipment



TRAY TRUCK



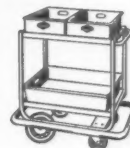
SHELF TRUCK



FOOD CONVEYER



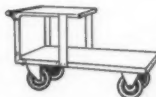
GARMENT RACKS



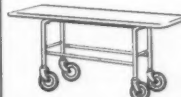
DISH TRUCK



MOP TRUCK



KITCHEN TRUCK



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Wide, narrow widths, in capacities
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lbs.



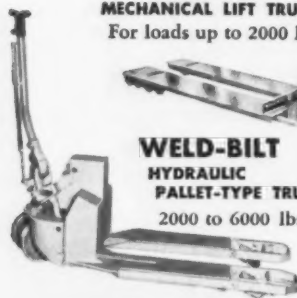
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For loads up to 2000 lbs.



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WEST BEND EQUIPMENT CORP. MATERIALS HANDLING ENGINEERS

307 WEST WATER STREET • WEST BEND, WIS.
... for more details, circle No. 96

been appointed service manager of the new branch.

Robert J. Burway, also from Los Angeles, will join the branch as a sales representative. Both the Los Angeles and the Phoenix branches are under the management of Robert E. Stone, industrial-automotive division district manager for the area.

Kwikset installs furnace for high temperature work

Installation of a high temperature, atmosphere controlled furnace capable of reaching 3,100 deg. F. has been installed by the Power Metals Division of Kwikset Locks, Inc., in Anaheim, Calif. In addition to helping Kwikset expand its research and development program, the furnace, a full muffle type heated by resistance type molybdenum elements, will be made available to industry for specialized research and development work in high temperature brazing, heat treatment, and sintering.

Temperature of the furnace is automatically controlled by radiation pyrometers coupled with a saturable core reactor circuit that provides stepless control of the temperature within a range of 5 deg. F.

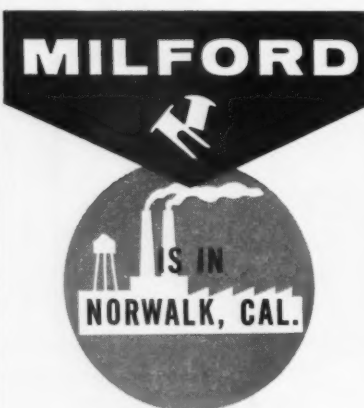


SIGN OF ADVANCEMENT is displayed by A. R. Maas Chemical Co. officials as they announce another "first in the West."

First Western production of potassium phosphate

A. R. Maas Chemical Co. in South Gate, Calif., is producing the first commercial quantities of potassium phosphate in the West. The phosphate, used to manufacture liquid soaps and detergents, has previously been shipped from the East.

Maas Chemical, which also produces photographic chemicals, electric furnace phosphoric acids and sodium phosphates, will be able to serve consumers on the West coast at substantial cost reductions.



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manufacturing facilities
within easy trucking distance
of your plant

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COLD-FORMED SPECIALTIES
RIVET-SETTING
MACHINES



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& MACHINE CO.

PACIFIC DIVISION

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OTHER PLANTS IN MILFORD, CONN.;
HATBORO, PENNA.; AURORA, ILL.; ELYRIA, OHIO

Construction in progress on two Neely buildings

Construction is underway on two buildings for Neely Enterprises, Los Angeles Electronics manufacturers' representative. Both buildings are of the same early California architecture as the firm's main office.

The first building, located in San Carlos to serve the San Francisco area, is almost completed and will provide 3,000 sq. ft. of floor area. This office will be headed by Jack Ingersoll.

The San Diego office, headed by Ed Moore, will have about 2,500 sq. ft. of space and is expected to be finished about the first of November.

Bay City Bearing completes fourth expansion program

Bay City Bearing Co., Inc., of Long Beach, Calif., has completed its fourth expansion program, which included the enlarging and remodeling of the Los Angeles office and the removal of the Long Beach office to larger quarters.

Two new warehouses were needed to house the expanded inventories of bearings, chains, gears, sprockets,

... for more details, circle No. 97

belts, seals, and allied mechanical transmission machinery. They will both serve the Los Angeles and Orange County areas.

Consolidated Electrodynamics buys Electronic Industries

Consolidated Electrodynamics Corp. of Pasadena, Calif., has acquired Electronic Industries, Inc. of Burbank. Electronic Industries, specializing in etched circuitry development and production, will become a wholly owned Consolidated subsidiary, but will retain its present name and activities.

Standard contracts to build Richmond plant

Standard Oil Co. of California has awarded a contract for the construction of a benzoic-toluic plant at its Richmond refinery. Designed to produce several million pounds annually, the plant is tentatively scheduled for completion late in 1956.

Benzoic-toluic will be marketed by Oronite Chemical Co., a Standard subsidiary, in conjunction with isophthalic as a modifier of alkyd resins to improve properties of paints, enamels, and other surface coatings.

Electronic Welding formed for contract welding

George Palmer has formed Electronic Welding Co. in Burbank, Calif., as a contract welding firm. Current projects of the firm include development of welding techniques for the Navy, prototype and pilot run welded assemblies for the missile program, and resistance welded assemblies for the jet engine program.

Palmer, who has 18 years of experience in various phases of the welding field, is conducting operations in a 20,000-sq. ft. building in Burbank.

Horning-Cooper announces name change, expansion

Horning-Cooper, Inc., of Monrovia, Calif., has announced jointly the change of the firm's name and an expansion program. The company will now be known as Cooper Development Corp., a name more apropos to the activities of the firm, which include development of rocket and missile systems and specialized electronic instrumentation.

Expansion plans involve construction of a two-story office building and additional manufacturing areas. The structure will house the expanding engineering staff, as well as laboratory and testing operations, and will more than double office space.

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